Response to comment L-4-1: Portions of this EIS have been rewritten or expanded concerning potential impacts, closure procedures, and schedule. Please refer to the specific DOE responses to the other EPA comments, dealing with these topics.

Response to comment L-4-2: As described in Section 4.2.4, the SRS Future Use Plan does not envision releasing the area from federal control. The tank farms are located in an area that will be zoned "industrial" as described by the Land Use Plan, and as such, any proposed redevelopment of the area would need to consider the closed tanks. The EIS, under the Clean and Remove Tanks Alternative, analyzed the impacts of removing the tanks and transporting the tank components to an onsite disposal facility.

Response to comment L-4-3: The SRS Future Use Plan and Section 4.2.4 of the EIS state that the integrity of site security shall be maintained, SRS boundaries shall remain unchanged, land will remain under ownership of the Federal Government, and residential uses of all SRS land shall be prohibited. Filling the tanks would not preclude tank removal in the future, if found to be necessary, but would make tank removal more difficult than removing an empty tank. The EIS, under the Clean and Remove Tanks Alternative, analyzed the impacts of removing empty tanks and transporting the tank components to an onsite disposal facility.

Response to comment L-4-4: The last sentence in the first paragraph of the Section "Tank Stabilization" in Section 2.1.1 has been revised to say"…material (grout or saltstone), or sand."

Response to comment L-4-5: The volume of saltstone generated from salt processing will occur regardless of what decision is made concerning tank closure. If tanks were to be filled with saltstone from salt processing, the excess saltstone, beyond tank capacity, would be disposed of in the Saltstone Disposal Facility.

Response to comment L-4-6: The third paragraph of Section 2.1.3 has been revised to include a comparison to the number of workers under the Clean and Remove Tanks Alternative.

Response to comment L-4-7: The values in the Summary (Table S-2) have been corrected.

Response to comment L-4-8: The second to last paragraph of Section 4.1.8.1 of the Draft EIS has been deleted as it refers to post-closure impacts that are not presented in Table 4.1.8-2. Those impacts are presented in Tables C.4.1-1 through C.4.1-6.

Response to comment L-4-9: The third paragraph of the CEQ Cumulative Effects Guidance Section has been changed to "six" areas of concern.

Response to comment L-4-10: In the first paragraph of Section 6.1, the phrase "cultural resources" has been removed from the sentence and a new sentence has been added: "These actions are not expected to impact cultural resources."

Response to comment L-4-11: In the second to last paragraph of Section C.2.1.2, the "n" has been changed to the word "no."

Response to comment L-4-12: This paragraph has been added after the second paragraph in Section S.2.4 and at the end of Section 1.1.4.1: "Several issues related to the HLW tank closure program will be resolved after DOE selects an overall tank closure approach based on this EIS. These issues will be addressed during the tank-by-tank implementation of the closure decision, and include: (1) performance objectives for each tank that allow the cumulative closure to meet the overall performance standard; (2) the regulatory status of residual waste in each tank, through a determination whether it is 'waste incidental to reprocessing;' (3) use of cleaning methods such as spray water washing or oxalic acid cleaning, if needed to meet a tank's performance objective; and (4) cleaning methods for tank secondary containment (annulus), if needed. These issues are discussed in greater detail below. (In addition, DOE is assessing the contributions to risk from non-tank sources in the H-Area Tank Farm. Although the long-term impacts presented in this EIS consider the contributions of non-tank sources, further characterization and modeling of contributions from other sources may result in the refinement of performance objectives. An issue to be addressed after tank closure is the long-term management of the area, which DOE will consider under the RCRA/ CERCLA processes as part of its environmental restoration program.)"

Response to comment L-4-13: The following text has been added in the Summary (Section S.2.2) and Section 1.1.2 of the EIS: "The proposed construction, operation and monitoring, and closure of a geologic repository at the Yucca Mountain site in Nevada is the subject of a separate EIS. As part of that process, DOE issued a Draft EIS for a geologic repository at Yucca Mountain, Nevada, in August 1999 (64 FR 156), and a Supplement to the Draft EIS in May 2001 (66 FR 22540). The Final EIS was approved and DOE announced the electronic and reading room availability in February 2002 (67 FR 9048). The President has recommended to the Congress that the Yucca Mountain site is suitable as a geologic repository. If the Yucca Mountain Site is licensed by the Nuclear Regulatory Commission (NRC) for development as a geologic repository, current schedules indicate that the repository could begin receiving waste as early as 2010. DOE has not yet developed schedules for sending specific wastes, such as the glass-filled canisters, to the repository."

Response to comment L-4-14: Sections S.2.2 and 1.1.2 were updated to reflect the current status of the Salt Processing Alternatives EIS and its Record of Decision. In addition, the following sentence was added to those sections: "Selecting a salt processing technology was necessary in order to empty the tanks and allow tank closure to proceed."

Response to comment L-4-15: Further information on the costs of each alternative (that presented in Section 2.3 of the Final EIS) has been added to the Summary (Section S.8.1).

Response to comment L-4-16: Schedule is included in the EIS in Section 3.9.1.3.

Response to comment L-4-17: The Salt Processing Alternatives project is currently on schedule. As shown in Figure 3.9-1 of the EIS, a technology needs to be on-line by 2010 in order to support the FFA schedule for tank closure. As with any large project, there are technical and budget issues that may arise that would have to be successfully managed to achieve operation by 2010.

Response to comment L-4-18: DOE agrees and has added a figure (Figure C-1) to improve the explanation of the conceptual model.

Response to comment L-4-19: DOE would make decisions regarding the need for a cap over the closed HLW tanks as part of the Environmental Restoration Program, as described in Section A.4.5. An engineered cap might reduce or delay the long-term impacts that are presented in this EIS. However, because decisions on capping could not be made until after all of the tanks in a group were closed, it would be premature to assume that an engineered cap would help reduce or delay long-term impacts from tank closure. Therefore, for the long-term contaminant transport modeling presented in the EIS, DOE conservatively assumed that there would be no cap over the closed tanks. As described in Appendix C, for the Stabilize Tanks Alternative, DOE assumed that the tank top, fill material, and basemat fail simultaneously at 1,000 years, with a corresponding increase in the hydraulic conductivity and infiltration rates. Prior to 1,000 years, the rate of infiltration of water is assumed to be controlled by the hydraulic conductivity of the intact concrete. For the No Action Alternative, the tank top and basemat are assumed to fail at 100 years.

Response to comment L-4-20, L-4-21, and L-4-22: Section S.8.2 has been revised as follows: "The fate and transport modeling indicates that movement of residual radiological contaminants from closed HLW tanks to nearby surface waters via groundwater would also be limited by the three stabilization options under the Stabilize Tanks Alternative. Based on the modeling results, all three stabilization options under the Stabilize Tanks Alternative would be more effective than the No Action Alternative. The Fill with Grout Option would be the most effective of the three tank stabilization options, as far as minimizing long-term movement of residual radiological contaminants."

Response to comment L-4-23: Following bulk waste removal, DOE would clean the tanks, if necessary, to meet the performance objectives contained in the General Closure Plan and the tank-specific Closure Module. In accordance with the General Closure Plan, the need for and the extent of any tank cleaning would be determined based on the analysis presented in the tank-specific Closure Module.

On a tank-by-tank basis, using performance and historical data, DOE would determine whether bulk waste removal, with water washing as appropriate, would meet Criterion 1 for removal of key radionuclides to the extent "technically and economically practical" (DOE Manual 435.1-1). If any criterion could not be met, cleaning methods, such as spray water washes or oxalic acid cleaning, could be employed. On a tank-by-tank basis, DOE will evaluate the long-term human health impacts of further waste removal versus the additional economic costs.

Tank cleaning by spray water washing involves washing each tank, using hot water in rotary spray jets. The spray nozzles can remove waste near the edges of the tank that is not readily removed by slurry pumps. After spraying, the contents of the tank would be agitated with slurry pumps and the subsequent liquid pumped out of the tank. This process has been demonstrated on Tanks 16 (which has not been closed) and 17 (which has been closed). If modeling evaluations showed that performance objectives could not be met after an initial spray water washing, additional spray water washes would be used prior to employing other cleaning techniques.

If Criteria 2 and 3 could not be met using spray water washing, other cleaning techniques could be employed. These techniques could include mechanical methods, oxalic acid cleaning, or other chemical cleaning methods. If oxalic acid cleaning were chosen, hot oxalic acid would be sprayed through the spray nozzles that were used for spray water washing. Oxalic acid has been demonstrated in Tank 16 only and shown to provide cleaning that is much more effective than spray water washing for removal of radioactivity (See Table S-1). However, oxalic acid cleaning costs far more than water washing, and there are important technical constraints on its use. Use of oxalic acid in an HLW tank would require successfully demonstrating that dissolution of HLW sludge solids by the acid would not create a potential for a nuclear criticality.

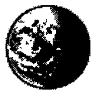
The potential for nuclear criticality is one significant technical constraint on the practicality of chemical cleaning (such as with oxalic acid). Concern about potential criticality would not preclude using chemical cleaning. However, a thorough, tank-specific evaluation for criticality would need to be done before using chemical cleaning in any tank and may result in the identification of additional tank-specific controls to ensure prevention of criticality.

Response to comment L-4-24: Section 4.1.3.2 describes the airborne emissions attributable to tank closure activities for each alternative. The phrase "after tank closure" has been added to the third paragraph of Section C.1.1 to clarify this point. A reference to Section 4.1.3.2 was also added to Section C.1.1.

Response to comment L-4-25: The exposure points for the worker and the resident receptors are different. The worker is assumed to be present at the seepline, where the soil is very damp, which would make resuspension and inhalation of soil very unlikely. The resident is assumed to reside on the opposite side of the stream, at a downstream location that ensures complete mixing of the seep water with the surface water. At this hypothetical resident location, the soil moisture characteristics cannot be accurately defined, therefore, it was conservatively assumed that resuspension and inhalation of soil could occur.

Response to comment L-4-26: As discussed in the first paragraph of Section C.2.2.2, sediment as an exposure medium for terrestrial wildlife was not quantitatively evaluated. This is because estimating sediment contamination from surface water inputs would be highly speculative. Seepage into sediment is not considered in the groundwater model; however, because exposure to chemicals in sediments is theoretically possible, the first paragraph of Section C.2.2.2, has been revised to clarify this point.

Response to comment L-4-27: The fish consumption rate used in the long-term dose assessment modeling was derived from SRS-specific studies. DOE would use all appropriate institutional control measures, including the possibility of using warning signs related to fish consumption. The specific details of these measures over the long term are speculative and cannot be accurately predicted at this time. The states of South Carolina and Georgia have programs in place to assess the quality of water in the Savannah River and other surface water bodies in their states and post fish consumption advisories which they deem necessary. There is no public fishing access to the on-site streams assessed in this EIS.



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Subject: Tank Closure EIS

01/26/01 12:11 PM

Drew,

Greetings; Please find attached my comments on the HLW Tank Closure draft EIS. If you have any questions or comments, please do not hesitate to contact me.

Regards,

Mike French
(803)642-0735
<<COMMENTS ON DRAFT TANK CLOSURE EIS.doc>>

COMMENTS ON DRAFT TANK CLOSURE EIS.doc

Rec.
JAN 26 2001

COMMENTS ON DRAFT TANK CLOSURE EIS.

1. Various CAB Committees have stated that they believe that Salt Processing and HLW Tank Closure to be the most important activity at SRS. Consequently, we believe that it is imperative get on with Tank Closure activities as expeditiously as possible, and under no circumstances allow this EIS – or any other item – to interfere with the closure schedule negotiated with the Site regulators. L-5-1

2. The statement "... Highly Corrosive Waste ..." is not correct. The word "corrosive should be deleted, as the waste is not corrosive to its containment system. Leaks into the annulus are as a result of stress corrosion cracking because the lower tank weld was not annealed prior to use. L-5-2

3. On P. S8 you state that waste that leaked into the annulus of Tank 16 has not been removed. However, on P.S11 it states that the annulus cleaning operation was "only 70% completed". These 2 statements are not consistent. Also on P. S11, we believe that you are seriously underestimating the annulus cleaning problem as indicated in several CAB committee meetings. Emphasizing this issue, the CAB is in process of submitting recommendations to DOE/SR that state that 1. "SRS develop, test and have a method for annuli cleaning for use no later than 2007" & 2. " SRS develop a HLW tank-annulus cleaning plan .... and submit it to Salt Team Focus Group before the end of 2001! L-5-3

4. I believe that the 4mrem/yr dose consequence regulatory limit at the seep is too low & unrealistic. You emphasize that the contaminants from all tanks should not exceed this limit! Once again, it should be emphasized that the 4mrem/yr is municipal water drinking standard, & as such is hardly applicable. Furthermore, if I interpret Table S-2 correctly, only the "clean & grout" option stands a chance of meeting this limit. Consequently, as this 4mrem/yr limit poses no health risk in this case, a higher, more realistic limit should be evaluated in this EIS & negotiated with the regulators as soon as possible. L-5-4

5. On Pages S10 & 11, you talk about the potential for a nuclear criticality when using oxalic acid cleaning. I would question that statement. As a minimum, I believe that a detailed explanation of these statements would be appropriate & useful. This also ties in with the CAB recommendation discussed in #3 above. L-5-5

6. On Page S12, the potential impact of new missions at SRS are discussed re additional HLW generation. In particular you refer to the 3 new Pu disposition facilities, & state that "these will not add to the current HLW waste inventory at SRS". I do not believe that this statement is true. Specifically, in the Pit Disassembly & Conversion Facility, DOE has approved the addition of a "Polishing Capability" to the front end of the unit, whose sole function is to remove Americium & other "nasty materials" from the Pu. Surely these impurities constitute HLW & should be treated as such just like the Pu residues from RFETS. As you indicate, treating the latter at SRS is expected to result in an additional 5 DWPF canisters. I believe this needs to be checked out. L-5-6

7. Per #6, how can you guarantee that additional new programs that might come to SRS will not be HLW generators? Don't let yourself get "boxed in" & allow for contingencies. L-5-7

Response to comment L-5-1: DOE agrees that HLW tank closure is important and that undertaking tank closure activities expeditiously is an important objective.

Response to comment L-5-2: The word "corrosive" has been deleted in Sections S.1 and 1.1.

Response to comment L-5-3: The last sentence of the third paragraph of Section S.2.3 has been revised as follows: "Waste removal from the Tank 16 primary vessel was completed in 1980. DOE removed some waste from the annulus at that time, but some dry waste still remains in the annulus."

The following new paragraph concerning DOE's response to the CAB recommendations has been added to Sections S.2.3 and 1.4.3: "The SRS CAB recommendation (January 23, 2001) regarding annulus cleaning stated the Board's concern that SRS appears to be placing a low priority on annulus cleaning. DOE responded to this recommendation (February 8, 2001) stating, 'the Savannah River Operations Office considers the issue of removal of waste from the tank annulus to be important to the long-term success of the HLW Tank Closure program.' The response further states, 'However, the development of methods for removal of waste from the tank annulus as part of the longer term effort to close Tank 14 reflects a balanced and responsive approach to solving this important challenge.' This conclusion is valid for closure of all tanks that have annuli."

Response to comment L-5-4: Chapter 7 of the EIS describes the process DOE used in reviewing requirements and guidance to identify environmental protection standards. Since application of the 4 mrem/year drinking water standard at the seepline was established by SCDHEC, DOE does not consider looking at a higher regulatory limit to be useful as this requirement is not likely to be relaxed. Sections 2.4.2 and 4.2.2.2 have been revised to state that the contaminant level at the seepline is specified in the General Closure Plan for the tanks as the regulatory compliance point for groundwater, and would be compared with the 4 mrem/year standard.

Additionally, your observation is correct relative to the options and this is one of the main reasons DOE prefers the Fill with Grout Option of the Stabilize Tanks Alternative.

Response to comment L-5-5: The detailed discussion requested exceeds the level of detail appropriate for an EIS summary. Criticality and other concerns associated with the use of oxalic acid are discussed in Sections 2.1, A.4.3, and B.3.1. Also, see the response to comment L-7-32.

Response to comment L-5-6: This EIS considers alternatives for closure of empty HLW tanks; therefore, impacts of new HLW generation are not within the scope of this document.

The HLW program utilizes a "High-Level Waste System Plan" to help plan and manage the operation of the tank farms, DWPF, and associated systems. This plan is updated annually and whenever there are major perturbations to the system. Included in this plan are the known influents to the HLW system. Potential impacts from new missions will be included in this planning document.

Response to comment L-5-7: The HLW program utilizes a "High-Level Waste System Plan" to help plan and manage the operation of the tank farms, DWPF, and associated systems. This plan is updated annually and whenever there are major perturbations to the system. Included in this plan are the known influents to the HLW system. Potential impacts from new missions will be included in this planning document.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 22, 2001

Rec.
JAN 24 2001

Andrew R. Grainger
NEPA Compliance Officer
Savannah River Site
Building 742-A, Room 185
Aiken, SC 29802

Dear Mr. Grainger:

NRC staff have reviewed the U.S. Department of Energy's (DOE) "Savannah River [SR] Site High-Level Waste [HLW] Tank Closure Draft Environmental Impact Statement [EIS]," and have prepared the following list of comments on the document.

1. **Comment:**

   None of the NRC recommendations from its review appear to have been incorporated.

   Basis:

   NRC staff performed a review of the DOE-SR methodology for determining that residual tank waste met the incidental waste criteria. The results of the review are summarized in the June 30, 2000 letter and associated technical evaluation report (TER) (letter from W. Kane/NRC to R. Schepens/ DOE-SR, June 30, 2000). Staff recognizes that the Draft EIS was in preparation at the same time as the NRC review was being performed. L-6-1

   Recommendation:

   NRC staff suggests incorporation of its recommendations in the Final EIS and supporting performance assessment(s).

2. **Comment:**

   There is no cost-benefit analysis provided for the alternatives.

   Basis:

   No cost-benefit analysis has been provided. Only order of magnitude estimates are provided on page 2-9. A cost-benefit analysis (including rad-worker exposure) for the various alternatives would be useful for comparison. It would prove particularly useful in comparing the "Fill with Grout" and "Fill with Saltstone" alternatives. If the "Fill with Saltstone" alternative were selected, normal saltstone activities at the Saltstone Manufacturing and Disposal Facility in Z-Area would be decreased. It is not apparent in the Draft EIS that the cost analysis (discussion on pages S-10, 2-5) for the "Fill with Saltstone" alternative takes into consideration the cost-savings from decreased usage of the Saltstone Manufacturing and Disposal Facility in Z-Area and construction of fewer disposal vaults, nor L-6-2

A. Grainger -2-

does it appear to balance worker exposure from filling tanks with saltstone against the worker exposures that would have occurred at the Z-Area facility.

Recommendation:

Provide a thorough cost-benefit analysis in the Final EIS to aid in comparison of alternatives. L-6-2

3. **Comment:**

There is no discussion of the waste form meeting Class C concentration limits as required by DOE G435.1, Section II.B, "Waste Incidental to Reprocessing." (See also comment 5.)

Basis:

The third criterion in DOE G435.1 for Waste Incidental to Reprocessing is that, "the waste will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C low-level waste as set out in 10 CFR 61.55." Not only is this requirement never discussed, it is also conspicuously absent from direct quotations of DOE G435.1 (Text Box page S-9, page S-17, Text Box page 1-11, page 2-2, page 7-5 etc.). L-6-3

Recommendation:

Provide an analysis of the residual tank waste with respect to this criterion, or provide a rationale for alternative waste classification as discussed in DOE G435.1, Section II.B(2)(a)3.

4. **Comment:**

The Waste Incidental to Reprocessing analysis provided in the Draft EIS is inconclusive.

Basis:

There are three incidental waste criteria in DOE G435.1. The second requires "the waste meet safety requirements comparable to the performance objectives set out in 10 CFR Part 61...." One of the performance objectives is protection of an inadvertent intruder. The Part 61 intruder is a resident farmer (with a well), which would place the farmer near the tank farms (i.e., the 1m or 100m wells). The dose limit for an inadvertent intruder is 500 mrem/year. It appears from the information provided in this Draft EIS, that a resident farmer on H-tank farm would receive ~ 100 rem/yr from 1m well (+20% for other sources (pages 4-47 and C-24)). Pages 2-28 and 4-34 state that the 1m and 100m well doses are extremely conservative due to modeling assumptions. In addition, there is a complete absence of any discussion in the Draft EIS of the third criterion, which requires that the waste be "incorporated in a solid physical form at a concentration that does not exceed the applicable L-6-4

A. Grainger -3-

concentration limits for Class C low-level waste as set out in 10 CFR 61.55." The Class C concentration limits were developed to protect an inadvertent intruder, which is particularly important because the intruder performance objective is the one that is not met.

When NRC staff reviewed the DOE-SR methodology for meeting the incidental waste criteria, the information we were provided indicated that a resident farmer intruder would be protected at F-tank farm. The methodology also indicated that Class C concentration limits could not be met for all tanks, however, a rationale similar to the provisions in 10 CFR 61.58 was provided. (10 CFR 61.58 states that, "[t]he Commission may... authorize other provisions for the classification... of waste on a specific basis, if, after evaluation, or the specific characteristics of the waste, disposal site, and method of disposal, it finds reasonable assurance of compliance with the performance objectives in subpart C of this part.") Based on the information provided, NRC staff concluded that "the methodology for tank closure at SRS appears to reasonably analyse the relevant considerations for Criterion One and Criterion Three of the incidental waste criteria. DOE would undertake cleanup to the maximum extent that is technically and economically practical, and would demonstrate it can meet performance objectives consistent with those required for disposal of low-level waste. These commitments, if satisfied, should serve to provide adequate protection of public health and safety (June 30, 2000 letter)." In addition, staff recommended that DOE-SR develop site-specific concentration limits. L-6-4

The information currently provided in the Draft EIS does not conclusively support the Waste Incidental to Reprocessing determination, for two of the three criteria listed in DOE G435.1.

Recommendation:

(1) Perform an updated performance assessment which does not artificially skew the 1m and 100m well results (i.e., provides a more realistic analysis). However, if these results show a drinking water dose greater than 416 mrem/year (500 mrem/year ÷ 120%), the 10 CFR Part 61 resident farmer intruder may not be sufficiently protected.

OR

(2) Provide sufficient rationale for extended institutional controls, and explain how they would provide protection to an inadvertent intruder comparable to that provided by the performance objectives in 10 CFR Part 61.

5. **Editorial Comment:**

This document needs more technical editing.

Basis: L-6-5

There are many mistakes in the document, including spelling, grammar and misuse of terms, for example:

A. Grainger -4-

On page 3-5, it states that, "[t]he mineralogy of the sands and pebbles primarily consists of quarts and feldspars."

On page 1-10, the document abbreviates the National Research Council as "NRC;" however, the list of Abbreviations (and later sections of the document) use "NRC" to mean the U.S. Nuclear Regulatory Commission. L-6-5

Recommendation:

The Final EIS should be more closely edited.

If you have any questions on this letter, please contact Jennifer Davis, of my staff, at (301) 415-5874, or bjd1@nrc.gov.

Sincerely,

Thomas H. Essig

Thomas H. Essig, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Materials Safety
and Safeguards

Response to comment L-6-1: DOE expects to make waste incidental to reprocessing determinations tank by tank, based on analyses that will be provided in future tank-specific Closure Modules. The NRC recommendations, which included such items as additional sensitivity analyses and calculations for the long-term performance evaluation, will be incorporated in these analyses. The level of detail requested is not appropriate for the EIS.

Response to comment L-6-2: The Draft EIS presented data on both the costs and impacts of each alternative. Further details regarding quantitative cost-benefit analysis are not required by NEPA regulations and would not be appropriate for the EIS. The Final EIS Summary (Section S.8.1) has been revised to more clearly present the cost information from Chapter 2 of the EIS.

Response to comment L-6-3: The text in the referenced text boxes was not intended to be a direct quotation from DOE Manual 435.1-1. The text included in Criterion 3 the fact that DOE will manage the waste in accordance with AEA and 435.1-1 requirements. 10 CFR 61.55 Class C requirements are addressed in 435.1-1. These text boxes were intended to address instances where the residual material would be managed as low-level waste or as transuranic waste, depending on the concentration of alpha-emitting radionuclides in the residual. The text in the referenced text boxes has been revised to include all of Criterion 3. As a result of several comments, the text in Section 2.1 of the Final EIS has been revised to provide a more comprehensive discussion of DOE's Waste Incidental to Reprocessing determination process, including the requirement to meet Class C limits (if the residual material was considered low-level waste).

Response to comment L-6-4: Identification of standards for the long-term performance of the SRS HLW tank closure process was the result of a series of interactions between DOE, SCDHEC, and EPA Region 4. The South Carolina regulations on closure of facilities permitted as industrial wastewater treatment systems (R.61-82, "Proper Closeout of Wastewater Treatment Facilities") require that such closures be carried out in accordance with site-specific guidelines established by SCDHEC to prevent health hazards and to promote safety in and around the tank systems. As a result of these interactions, it was determined that the point of compliance for SRS HLW tank closure impacts would be the point at which the groundwater potentially impacted by contaminants from closed HLW tanks enters the accessible environment (i.e., the seepline).

This location is also in accordance with DOE policy on the long-term performance of closed HLW tanks. DOE Manual 435.1-1, Section IV.P.(2)(b) states, "The point of compliance shall correspond to the point of highest projected dose or concentration beyond a 100-meter buffer zone surrounding the disposed waste. A larger or smaller buffer zone may be used if adequate justification is provided." As discussed in DOE Guidance 435.1-1 (Page IV-193), this requirement provides flexibility in establishing the extent of the buffer zone considering site-specific issues. For example, in cases where the disposal facility is located far from the DOE site boundary, and the site's land-use planning does not envision relinquishing control of the site, a larger buffer zone could be considered. The justification for the selection of the point of compliance and size of the buffer zone is based on land use plans and commitments that have been negotiated during consent agreements or other regulatory actions. The justification could also be based on the proximity of already existing contaminated areas or nearby operational facilities that establish a boundary, or which would render the 100-meter point of compliance as unreasonable.

Therefore, the long-term fate and transport modeling for HLW tank closure is optimized to provide the most accurate (while still conservative) results at the seepline. In doing so, DOE's assumption that the tank farms are nearly a point source is reasonable for a seepline that is nearly one mile downgradient.

Calculated doses at both the 1-meter and 100-meter wells for the H-Area Tank Farm north of the groundwater divide (the highest location) are dominated by a single tank group, Tanks 9-12, because of its vertical location within the water table. Since the 1-meter and 100-meter well locations are determined from the downgradient edge of the tank farm, and are therefore more than 1 meter and 100 meters from the edge of the tank group, the dose resulting from summing the doses from all tank groups within H-Area Tank Farm north of the groundwater divide is a close approximation to the maximum dose from that tank group. The results reported in the EIS indicate that the 100-meter well drinking water dose would comply with the cited criterion under the Fill with Grout Option (the highest dose under this option is 300 mrem/year for the H-Area Tank Farm, north of the groundwater divide), but not under the other options of the Stabilize Tanks Alternative, nor under the No Action Alternative. Under the Fill with Grout Option, the dose at the seepline is within the 4 mrem/year performance objective for both F-and H-Area Tank Farms.

Meeting all three criteria under the waste incidental to reprocessing requirement is a condition for closure of the tanks. For closure of a specific tank, DOE must demonstrate that all three criteria are satisfied before the tank can be closed. For example, if the residual material remaining in the HLW tank did not conform to the definition of Class C Waste from 10 CFR 61.55, DOE could apply the methodology presented in the NRC's Branch Technical Position on Concentration Averaging to demonstrate that the configuration of the resulting closed tank conforms with this concentration criterion. DOE's determination of how a closed tank conforms to the waste incidental to reprocessing criteria will be included in Tank Specific Closure Modules.

<u>Response to comment L-6-5</u>: The Final EIS was subjected to a thorough technical edit prior to publication.

Drew Grainger

01/24/01 01:16 PM

To: L Ling/DOE/Srs@Srs, George Hannah@Srs, John Knox/DOE/Srs@Srs
cc:
Subject: Comments on Tank Closure EIS

----- Forwarded by Drew Grainger/DOE/Srs on 01/24/01 01:18 PM -----

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Please respond to leepoe

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Subject: Comments on Tank Closure EIS

Attached are my comments on the Tank Closure EIS.

Please respond telling me you recieved them. I will mail you a copy if you desire a signed copy.

Thanks Lee

Comments on Tk Closure EIS.doc

January 23, 2001
807 E. Rollingwood Rd
Aiken, SC 29801

Mr. Andrew R. Grainger
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Comments on Tank Closure EIS
DOE/EIS-0303D, November 2000

I would like to provide the following comments on DOE/EIS-0303D.

General Comments:

1. **Get on with the closure of HLW Tanks.** Do not allow this EIS or anything else interfere with the closure schedule that has been negotiated with SRS regulators. Tank 19F closure schedule is 2003 but the plan for closure is 2002. Meet the planned schedule. Closure of the remaining tank in the four-pack is scheduled for 2004. Meet these and all other HLW Tank closure schedules. L-7-1

2. **Select the "Clean and Stabilize Tanks Alternative" with the "Fill with Grout" option.** It is the only long-term alternative/option that provides sufficient long term environmental protection. The option "Fill with Sand" allows water to freely flow through the sand (after tank failure) hastening release of radionuclides. The "Fill with Saltstone" requires three saltstone manufacture plants at unnecessary expense. The "Clean and Remove the Tank" does not provide the environmental impacts of long-term storage of the steel and concrete rubble. Of course the "No Action" is an incomplete cleanup of the SRS. L-7-2

3. I suggest the site look at and include a higher regulatory limit than the 4 mrem/yr dose consequence at the seep. Based on my knowledge of the HLW System, I doubt that the inventories of radionuclides postulated to be left in the tank system can be met, in reality. To achieve the projected inventories may be impossible or very difficult and require much more water washing and tank cleaning. **A higher regulatory limit should be considered in the EIS.** The 4 mrem/yr limit poses no health consequence and a higher limit should be evaluated in this EIS and appropriate administrative controls (but not another EIS) should be specified now in this EIS to allow its use if needed. L-7-3

Page 1

4. **The 20% additional inventory, allowed for piping, equipment, etc, should be given a more prominent position in the EIS.** I was able to find it only in Appendix C. L-7-4

5. **Information should be included in the EIS on how waste and waste residues, left in the HLW Tanks, will be measured and how well the residual quantities will be known.** This issue is a paramount issue in establishing cleanliness before closure can be initiated. At this time, it is not dealt with in this EIS. L-7-5

6. **The environmental impacts of all alternatives should be included in this EIS.** If those impacts have been previously determined in other EIS's, the impacts should be included here also. Only in this manner can the decision-maker compare and evaluate the various alternatives. L-7-6

7. **Include a section on Institutional Controls (IC) planned to ensure both near-term and long-term safety of the public.** For example, if IC do not prevent intrusion to the water table and use of the groundwater, adoption of the seep line limit makes no sense. L-7-7

8. **The summary should be included in the large EIS book.** Or at the very least, the big book should say this is only a partial EIS. L-7-8

Specific Comments:

<u>Summary:</u>

1. The Summary is well written and includes much of the pertinent findings of the EIS. L-7-9

2. In the second paragraph of S-1, delete the word corrosive when describing the waste. The waste is not corrosive to the system it is contained in. This also makes this section consistent with other sections in the EIS that describe the waste as highly radioactive. L-7-10

3. Add to section S.2.3 a short paragraph on the basis for HLW Tank cracking and its present status. L-7-11

4. On Page S-8, in the second paragraph, add a short sentence stating why Tanks 17 and 20 cracks are thought to be groundwater corrosion. Does this infer that the tanks components exposed to groundwater are severely corroded? L-7-12

5. In the last paragraph in Section S.2.3 (page S-8), add a sentence or two on why the primary of Type III tanks have not leaked. L-7-13

Page 2

6. The second paragraph of Section S.2.4 states DOE has reviewed several EIS for waste removal. The section should summarize what DOE found in this review. L-7-14

7. The Performance Objective paragraph, on Page S-9, should be expanded to provide the CAB the opportunity to review of the tank specific Closure Modules at the same time as the regulator's review. L-7-15

8. The cumulative curies removed in Table S-1 are shown to be 10^{-6}. The minus sign is a typographical error. L-7-16

9. I consider the last sentence is Section S.2.4, on Page S-11, to be wrong. SRS documentation of the waste in the annulus of Tank 16 show it contains 30,000 curies of Cs-137. That amount of waste exceeds the entire inventory in F- or H-Areas used in calculating the dose rates in Table S-3. Other examples can also be given to show the inventory is large compared to the values given in Table C.3.1-1. L-7-17

10. The middle paragraph in Page S-12 says that in response to comments DOE has included total volumes of waste remaining in the tanks as residual waste. I have been unable to locate this. It is obviously used in the analysis that went into the EIS. L-7-18

11. If I assume the 4 mrem/yr seepline limit, Table S-3 (page S-22) shows that two of the alternatives examined will exceed the limit and the third will be essentially at the limit. Only "Clean and Fill with Grout" is acceptable. See General Comment number 3 above that proposes a higher limit than the 4 mrem/yr. L-7-19

12. Please check the "No Action" seepline dose rate to Upper Three Runs Creek. Table S-3 shows it to be 2,500 mrem/yr. That value seems high when compared with other values given and is probably a typographical error. L-7-20

13. Figure S-7 shows a plot of predicted drinking water dose over the 10,000-year analysis period. Add information to the text to show why the curves appear as they do and what are the principal radionuclides reaching the creeks. It is my understanding that the dose rate is primarily due to Tc^{99}. L-7-21

<u>Chapter 1:</u>

1. In the second paragraph, delete the word corrosive when describing the waste. The waste is not corrosive to the system it is contained in. This also makes this section consistent with other sections in the EIS that describe the waste as highly radioactive. L-7-22

2. On page 1-7, in the Section on Tanks, and in the third paragraph; change the wording of the fourth sentence. As written it infers all of the waste has been contained in the concrete encasement; it has not as mentioned for Tank 16. Suggest the sentence read "Most of the waste was contained in the concrete encasement……" L-7-23

Page 3

3. On page 1-7, in the Section on Tanks, and in the fourth paragraph; add a statement on Type III HLW Tank leakage or lack of it. This keeps section parallel to other sections. L-7-24

4. On page 1-7, in the Section on Evaporator Systems; aren't there three evaporators operating? Use care when you say words like "at present" because your reader thinks it is a statement of the condition at the time the EIS was published or when he is reading it and it is probably neither. L-7-25

5. On page 1-11, in the Section on Decisions to be based on this EIS, and in the first paragraph; the third sentence is not technically correct. Some of the environmental impacts are not included in the EIS but referenced to other NEPA documents. L-7-26

6. On page 1-12, in the second paragraph; the EIS states a tank-specific Closure Module is required. This specific Module should contain the measured inventory of residual waste after water washing and estimated inventory before tank stabilization with grout. (This EIS should specify what the type of information that will be contained in these tank-specific Closure Modules. L-7-27

7. The last full paragraph on page 1-12 should be expanded to describe the process in reference DOE-1996. This paragraph should describe the coordination and interactions between HLW and ER. L-7-28

8. The top paragraph on Page 1-13 say the ER activities will be governed by CERCLA/RCRA. Will the 4 mrem/yr at the seepline be rescinded and the DWS imposed at the HLW fence post as is currently being required for other CERCLA/RCRA sites? This last paragraph should be more informative. L-7-29

9. Include CAB/WM Committee/Salt FG interactions with SRS and the regulators in Section 1.4.3. L-7-30

Chapter 2:

1. On page 2-1, in the Section on HLW Tank Cleaning; the volume of waste left after spray washing was given for Tank 16 & 17, add similar information for Tank 20. Also add for the three tanks the amount of waste (probably expressed in curies) to the paragraph. L-7-31

2. The second paragraph on Page 2-2 states that a nuclear criticality evaluation is required before oxalic acid will be allowed. The EIS, by discussing it, gives the impression it is not a criticality contributor. If the EIS discussed oxalic acid washing as a possible mode of cleaning the tanks, it should be known to be acceptable. After reading this information, I am left with a significant question on its use. Please clarify. L-7-32

3. Table 2-1 on page 2-3 and associated text, SRS needs to include information to show the amount of waste left in the tank after oxalic acid cleaning. Otherwise the % removed and the cumulative columns are incomplete and do not tell the appropriate story. L-7-33

4. On page 2-3, in the second paragraph, add discussion on dissolution of salts from the annulus. L-7-34

5. Page 2-5 says that the saltstone alternative has "a large quantity of nitrates". This statement should be quantified to identify what the concern or point is. L-7-35

6. Section 2.1.4.2 should discuss the environmental impacts of delayed closure of the tanks. L-7-36

7. In Section 2.3 on page 2-9, in the middle paragraph; in addition to new technologies add demonstration of old technologies to the section. L-7-37

8. In Section 2.3 on page 2-9, the statement is made that "for the period of delay, the impact of this approach would be the same as the No-Action Alternative". Without additional information, I do not understand why it is true. If fact, I doubt that it is correct. L-7-38

9. Environmental Impacts of Clean and Remove Alternative are stated not to be included in the EIS because they are included in another EIS. This EIS should summarize the impacts, not leave them out. L-7-39

10. Section 2 should include discussion of accidents during the long-term. If the EIS doesn't determine them, a clear rational must be given. L-7-40

11. Section 2.4.2 on page 2-27 states "the principal source of potential impacts to the public health is leaching and groundwater transport of contaminants". With the analysis presented, I conclude that falling into an unfilled HLW tank with a high probability of death is a much larger public health consequence and risk. Contaminant transport will not kill members of the public. L-7-41

12. I consider the discussion on page 2-27 in the last paragraph comparing lifetime dose commitment and the single year limit to be weak. L-7-42

<u>Chapter 3:</u>

No comments are provided on this section. It contains lots of information in its 58 pages that is required by NEPA but does not impact the conclusions of this EIS. A better way of implementing the NEPA requirements should be developed for the many SRS EISs that essentially have the same type of information. L-7-43

<u>Chapter 4:</u>

1. Page 4-10 in Section 4.1.3.2, the EIS makes the assumption for Clean and Remove Tanks Alternative that HEPA Filtered enclosures are used during removal of metal from the tank enclosures. I question this assumption. It is not clear to me that the safety improvement justifies this requirement after the tank has been decontaminated and while the steel is being removed. L-7-44

2. Table 4.1.8-1 et al includes partial environmental impacts. The long-term impacts of disposal of the steel should be included. L-7-45

3. On page 4-25, the No Action Alternative environmental impacts are shown as zeros. That alternative will have impacts. L-7-46

4. Table 4.1.12-1 on page 4-29 does not include accident consequences for the No Action Alternative. It seems to me that the time duration of these type activities is 10,000 years not 30 as assumed for other alternatives resulting in probabilities of one for the various accidents. L-7-47

5. The long-term impacts for the Clean and Remove Tank alternative should be given in Section 4.2 (page 2-30). If the impacts are given in other EISs, they should be summarized here, as I stated under the General Comments. L-7-48

6. Table 4.2.2-6 (page 4-37) doesn't seem to include iron from the steel of the tanks. What are the impacts of this iron? L-7-49

7. Text associated with Figure 4.2.2-1, should describe when the plutonium is expected to arrive at the seep line and what impact it may have on dose rate. I expect it is beyond the 10,000 year analysis period but still should be given in the EIS. L-7-50

8. The Public Health (Section 4.2.5 on page 4-44) seems to be long-term effects. The title of the section should provide this information since there are other public impacts as well. L-7-51

<u>Chapter 5:</u>

1. Modify the section title on page 5-3 (Spacial and Temporal Boundaries), it is unclear. What is being covered here? L-7-52

2. Delete reference to a specific company (Bridgestone Tire) or use other company names. This usage is on page 5-3.) L-7-53

3. Table 5-2 (page 5-8) should include the impacts of the Composite Analysis for the 200-Areas (it includes the long-term impacts of other discharges to the SRS streams impacted by this EIS). L-7-54

Chapter 6:

No comments.

Chapter 7:

1. The example given on page 7-3 in Section 7.1.2, doesn't seem to be the most stringent requirement. Expand to ensure your reader understands the point you are making. L-7-55

Appendix A:

1. Add the basis for that statement made on Page A-5 "there is no evidence that he waste has leaked from the secondary containment". L-7-56

2. Section A.3 on page A-5, add a reference for Tank 16 "the 10s of gallons leakage that migrated to the surrounding soil" L-7-57

3. Page A-5 also contains the statement about Type IV tanks "small amounts of groundwater have leaked into these tanks". Also add a reference for the statement. L-7-58

4. Section A.3 needs a paragraph that describes when the cracks occurred and what is projected for the future. It is my understanding they occurred early in the Tank Farm life and cracking has decreased materially or stopped. Describe why. Tank 15 cracking may be the exception. Reader needs to feel the cracking is under control or has been eliminated. L-7-59

5. Last line on page A-5 has a spelling error. L-7-60

6. Change the work "complete" in Table A-1 on page A-7 as used in Tank 16 current usage. The work says the annulus cleaning is complete. I doubt that it is complete with 30,000 Ci of Cs-137 still in the annulus. It may have meant to state cleaning was stopped in the past. L-7-61

7. The first full paragraph on page A-9 describes 17 RCRA/CERCLA contaminations. Add a Table with this information showing the location and quantity of waste that leaked and what is still there. L-7-62

Page 7

8. Add the basis for the last statement in that first full paragraph on Page A-9. The one that states these leak sources probably will not contribute to the tank closure performance. L-7-63

9. Reference the source of the information in the second full paragraph on page A-9. In particular the leakage stated to be a few gallons but the date (and presumably other pertinent information on the leak) is unknown. This certainly raises questions on validity of what is being stated. L-7-64

10. Reference the Tank 16 leak statement in the top paragraph on page A-9. L-7-65

11. Expand the first sentence of the second paragraph in the right hand column of Page A-9. Why is it unlikely that waste has not leaked from other tanks? L-7-66

12. What is the basis for the last statement in the second paragraph in the right hand column of Page A-9? L-7-67

13. In Section A.3.2 on page A-9, the same comment as given earlier. Use care in using "recently" in an EIS. It won't be read the same way by all readers. I thought that there were three operating evaporators. L-7-68

14. Add a paragraph to Section A.3.2 describing how HLW evaporators are contained and shielded. L-7-69

15. At the top of page A-12, evaporator rated capacity is expressed as volume. The normal way to describe capacity of an evaporator is throughput rate (volume per unit time). L-7-70

16. Suggest rewording the last sentence of Section A.3.2. In the sentence supernate probably means evaporator feed. The volume is reduced to 25% of its original volume and it freezes as crystallized salt (perhaps that is the immobilize term used). Perhaps a better way to say this is that the concentrated waste crystallizes into a solid salt cake reducing its mobility. L-7-71

17. Add a paragraph describing the expected inventory of radionuclides after flushing and prior to closure. Is the inventory significant? Why is that judgment made? L-7-72

18. Section A.3.5 starts off saying that the HLW produced in the canyons contains insoluble and highly radioactive metal hydroxides. When initially produced, these hydroxides are in a meta-stable solution and require weeks for form the insoluble metal hydroxides. Thus the insoluble form occurs in the waste tanks not in the canyons. L-7-73

19. Section A.4.1 references earlier EISs. It is OK to reference them but also the key conclusions applicable to this EIS should be summarized here. I consider the waste L-7-74

removal heel to be one of the principal issues of uncertainty for success of this Tank Closure activity. L-7-74

20. In Section A.4, add several paragraphs on waste removal from tank annulus and from between the primary tank bottom and the annulus tank bottom. L-7-75

21. On page A-14, in Section A.4.3; the fourth paragraph states that only salt is in the annulus and it should be easily removed with water. Provide referencable support for the first point and basis for the second. It is my understanding there is very little information on dissolvability of salts in the annulus. We know Tank 16 salt did not dissolve and I understand the only other sample available also shows that the salt is difficult to dissolve. L-7-76

22. On page A-15, the last paragraph of Section A.4.3; it would be beneficial to the EIS to have descriptive information on what is known about how clean the primary Tank is based on the inspections made. L-7-77

23. Page A-19 &20, add more conceptual description on how the Clean and Remove Alternative would be accomplished. Will the removal and packaging be done remotely or hands on, etc.? L-7-78

24. The soil cover described in the last sentence on Page A-20 should also include prevention of deep-rooted plants so they will not add a new dispersion pathway. L-7-79

<u>Appendix B:</u>

1. As I read Section B.2 and looked at Table B-1; I concluded that 10,000 year analytical period made all of the accident frequencies greater than one. I later found that the accident analysis was performed for 30 years. It is very important to set the stage for this analysis. I do not understand why accident (particularly naturally occurring events) should not be looked at for the full 10,000 years. At the very least tell your reader that you are only examining 30 year tank closure period and not the decay and release time period. L-7-80

2. Section B.2.2 writes off surface runoff and underground releases by saying mitigative actions would be taken, again applies to the period of active institutional control. Why is this appropriate? L-7-81

3. Section B.3.1.1 on page B-5, needs to also consider in-tank-generated hydrogen. The analysis seems only to look at flammable chemicals that are accidentally introduced into the tanks. L-7-82

4. Section B.3 (Pages B.4 – B.7) should be expanded to consider loss of containment. The CAB is concerned about this with the numerous changes of equipment that L-7-83

Page 9

require opening and closing containment during sludge and salt removal and the same issues exist during tank cleaning. L-7-83

5. Section B.3.1.3 on Page B-6; add a paragraph to show why underground releases are not considered for seismic events. The only seismic event considered is one that releases the content of the above ground waste being pumped. I also do not consider mitigation appropriate for a severe seismic event of sufficient strength to breach HLW piping or tankage since off-site damage to essential infrastructure will also be sever and require immediate correction. This will dilute the priority that will be placed on SRS damage. L-7-84

6. Section B.3.1.7 (Page B-7) doesn't seem to include liquid release. Why not? L-7-85

7. Section B.3.2.1 states that flooding after 200 years is not considered. It is stated to be a long-term impacts and is not considered in Appendix B. Where is it included? In a 10,000 year analysis, this logic seems questionable. L-7-86

Appendix C:

1. The assumption in the third paragraph that DOE intends that the area immediately surrounding the tank farms would remain in commercial/industrial use for the entire 10,000 year period of analysis seems unlikely. There may be deed restrictions on these areas but the area will probably not look like commercial/industrial use that we currently recognize. L-7-87

2. The intruder on page C-1 is defined as a teenager. Why and did all of the parameters associated with dose commitment use teenager parameters? L-7-88

3. Section C.1.1 on Page C-3, in the bottom paragraph in the left column, the logic given for atmospheric releases seem unlikely but the conclusion seems reasonable. L-7-89

4. Does the nearby resident and the child resident, decribed on Pages C-6 & C-7 drink contaminated water? I am not able to tell if they do or do not from the write up given. L-7-90

5. Discussion on page C-9 says that the inventory is increased by 20% to account for tank-specific systems outside of the Waste Tanks. This is the only place I saw this and could find no calculated results from this assumption. One questions the validity of this assumption. Environmental impacts for the outside systems need to be given. L-7-91

6. Table C.3.1-1 provides the entire inventory for F-Area Tank Farm that results in 1.9 mrem/yr seepline dose rate for F-Area. The 4,300 Ci of Cs^{137} is the equivalent of 860 gallons of HLW left in the entire tank farm or on the average 39 gallons/tank. (This conversion of curies to gallons assumes HLW contains 1 to 20 curies of Cs^{137}/gallon HLW. I used 5 Ci/gallon for this conversion.) This small volume of waste raises the issue discussed in General Comment # 3. Similar calculation for H-Area Tank Farm L-7-92

give similar small volumes. It should be noted that the principal dose in the seeps are from Tc^{99} left in the tanks. Tc^{99} is more mobile than cesium. L-7-92

Appendix D:

Reading the comment and DOE Response then reading the EIS to ensure that the response was truly implemented, I found several that are inconsistent. DOE should reconsider the responses to the comments and the body of the EIS to be sure they are consistent. A couple of examples are listed below where the response did not seem to be carried through into the EIS.

- The response to the top comment-response given on Page D-3 in the right hand columns seems inconsistent with the text of the EIS. L-7-93
- The response (listed at the top of the left columns on Page D-4) says that lessons learned from closing tanks 17 and 20 will be used for closing other tanks. In general this was done, in that the experience from those tanks is the total experience to date on tank closure. I found no section that explicitly listed those lessons learned that were considered to be important.

I hope these comments are useful in reaching a decision that allows tank closure to continue on schedule. The process should recognize the potential that waste removal will be more difficult than planned and provide a preplanned process that accepts larger quantities of waste while not impacting safety of future generations downstream from SRS.

If I can answer questions or shed additional light on these issues, please call me.

Sincerely

W. Lee Poe, Jr.

Response to comment L-7-1: Comment noted.

Response to comment L-7-2: Comment noted.

Response to comment L-7-3: See response to comment L-5-4, first paragraph.

Response to comment L-7-4: As stated in Section 4.2.2.2, Appendix C presents the major assumptions and inputs used in the long-term fate and transport modeling, including the assumption regarding the contaminant inventory in piping and ancillary equipment. Section 1.4.1 describes the overall HLW tank closure process. Section 4.2.2.2 has been revised to more clearly state the assumptions regarding residual material in piping and ancillary equipment.

Response to comment L-7-5: DOE agrees that accurately measuring the residual is an important task. However, the EIS is a decision-making tool to determine the preferred closure alternative, which is independent of the method used to determine tank residuals. Only a summary description of residual characterization is possible now, until a closure method is chosen and tank-specific procedures are established. Two paragraphs were added to Section 4.2.2.2 and are included below.

"The source term for the modeling described in this EIS was based on knowledge of the processes that generated the waste. DOE assumed that the residuals left behind after waste removal would have approximately the same composition as the waste currently in the tanks. The total amount of radionuclides in the tank farms is well known, so this approach should yield a reasonable estimate of tank-farm-wide doses, because overestimates in one tank should be balanced by underestimates in another tank. This modeling also considered residual material remaining in piping and ancillary equipment associated with the closed HLW tanks. This piping and ancillary equipment is assumed to contribute an additional 20 percent of the inventory in the closed tanks.

Before each tank is closed, DOE will determine the actual residual in that tank and, through modeling, ensure that closure of the tank would be within requirements. In Tanks 17 and 20 (the two tanks that have been closed), this was done by separately estimating the volume and composition of the waste, and then combining these two pieces of information to develop tank inventories of each radionuclide of interest. A similar procedure will be followed in the future for residual waste in each tank. In Tanks 17 and 20, the depth of the solids was estimated at various points in the tank by comparing the sludge level to objects of known height in the tank, and this information was integrated over the area of the tank to yield a total tank volume of residual. The composition of the waste was estimated 1) by knowledge of the processes that sent waste to the tank and 2) by samples. If there was a discrepancy between the two methods, the method yielding the higher concentration was used for modeling. In the future, new techniques may need to be developed to accurately assess the residuals. For example, in tanks with high radionuclide concentration, the depth of solids remaining after aggressive cleaning may be too small to accurately measure visually, so some other technique may need to be employed."

Response to comment L-7-6: Section 2.1.2, has been revised to present a more detailed summary of impacts from the 1995 Waste Management EIS (DOE 1995) in indicating that impacts from low-level waste disposal of tank components in the vaults would be well below impacts expected from tank closure.

Response to comment L-7-7: See response to comment L-8-3. The specific details of the implementation of DOE's Institutional Controls would be developed as part of the Environmental Restoration Program.

Response to comment L-7-8: The Foreword and the Table of Contents in the EIS indicate that the Summary is published as a separate volume. DOE publishes the Summary separately as a service to the reader, many of whom only read the Summary. Publication of an EIS in several volumes is a common practice consistent with the Council on Environmental Quality NEPA regulations on the content of an EIS.

Response to comment L-7-9: Comment noted.

Response to comment L-7-10: The word "corrosive" has been deleted in Section S.1.

Response to comment L-7-11: Section S.2.3 is a summary section, so the level of detail suggested in the comment is not appropriate. However, the following additional technical information on tank cracking mechanisms and current tank status was added to Section 1.1.3: "The cracks in the Types I and II tanks were due to nitrate-induced stress corrosion cracking. The cracks generally occurred in the heat-affected zones adjacent to tank welds. These zones have high tensile stresses and are susceptible to the corrosive effects of the high concentrations of nitrates that occur in SRS wastes. Nitrate-induced stress corrosion cracking is inhibited by sodium hydroxide and sodium nitrite, but the initial wastes added to these tanks did not have sufficient inhibitors to prevent cracking. Since the time of the initial cracks, considerable research has been done to determine inhibitor levels that will prevent stress corrosion cracking and other types of corrosion that could affect the SRS tanks. (There are other types of corrosion, such as pitting that have not caused leaks, but are a potential threat.) SRS tanks are routinely sampled to determine inhibitor levels, and additional inhibitors are added if concentrations are not sufficient to prevent corrosion. In addition, the newest tanks (the Type III tanks) were stress relieved (heat-treated to remove residual stresses in the metal introduced during the manufacturing process) to eliminate the high stresses that promote cracking."

Response to comment L-7-12: There is no evidence to support a generalization that tank components in groundwater experience severe corrosion. Sections S.2.3 and 1.1.3 have been changed to read, "Interior photographic inspections have indicated that small amounts of groundwater have leaked into…"

Response to comment L-7-13: The following sentence has been added to the last paragraph in Section S.2.3: "During construction, the Type III tanks were stress relieved (heat treated to remove residual stresses in the metal introduced during the manufacturing process) to eliminate the high stresses that promote stress corrosion cracking."

Response to comment L-7-14: The intent of this paragraph was to illustrate that the environmental impacts of bulk waste removal have been previously analyzed in several EISs. In preparing this HLW Tank Closure EISs, DOE did not "review" these previous EISs, other than to confirm that they addressed the activities associated with bulk waste removal. Therefore, the first sentence of the second paragraph of Section S.2.4 has been revised to state: "DOE has analyzed the environmental impacts of bulk waste removal from the HLW tanks…."

Response to comment L-7-15: The CAB will be provided with the opportunity to review Closure Modules as a matter of regular interaction between DOE and the CAB. Also, see the response to comment L-2-1.

Response to comment L-7-16: The values for curies remaining in the tanks in the "Cumulative Curies Removed" column have been changed to "10^6" in Table S-1 and Table 2-1.

Response to comment L-7-17: The values for curies remaining in the tanks in Table C.3.1-1 represent the values after all waste removal has been completed. The SRS High-Level Waste Tank Closure program is designed such that DOE must remove enough waste from the HLW tank systems so the performance objectives would be met. This is true whether the residual waste is in the tank, the annulus, or piping and ancillary equipment. Therefore, DOE would be obligated to clean the tank annuli to a level at which the performance objectives for a tank would be met. In the case of Tank 16, DOE would remove Cs-137 from the annulus until modeling demonstrated that the performance objectives could be met. For other tanks that have annuli, as part of the tank closure process, DOE would be required to fully characterize any residual material remaining in the annulus. The last sentence of Sections S.2.4 and 2.1 have been revised to clarify this point.

Response to comment L-7-18: Appendix C has been revised to present Table C.3.1-2, which lists the assumed volume of residual waste remaining in each closed HLW tank if the tanks are cleaned.

Response to comment L-7-19: True. This is one of the main reasons DOE prefers the Fill with Grout Option of the Stabilize Tanks Alternative.

Response to comment L-7-20: The value of 2,500 mrem/year is correct for the No Action seepline dose rate at Upper Three Runs Creek. The No Action Alternative assumes that the tank contents are removed but residual waste is available for transport after the tank containment fails. This residual waste results in the high dose observed for this alternative.

Response to comment L-7-21: Further information describing Figure S-7 has been added to Section S.8.2.

Response to comment L-7-22: The word "corrosive" has been deleted in Section 1.1.

Response to comment L-7-23: Section 1.1.3 has been revised as suggested in the comment.

Response to comment L-7-24: The fifth paragraph of the section labeled "tanks" (which discusses the Type III tanks) contains the sentence "None of them has known leak sites." Therefore, no change to the EIS in required.

Response to comment L-7-25: True. The wording in the "Evaporator Systems" sections of Chapter 1, Appendix A and Appendix E were changed to reflect two evaporators in F-Area and three evaporators in H-Area, and indicate that three evaporators are operational.

Response to comment L-7-26: This EIS provides the decision maker with an assessment of the environmental impacts that would provide a discrimination between alternatives. Details of certain impacts are provided by summarizing information from other EISs and providing reference to these other documents. This approach is allowed, in fact recommended in the CEQ regulations at 40 CFR 1502.21.

Response to comment L-7-27: The second paragraph of Section 1.3 has been revised to state that the module will also contain the measured inventory of residual material in the tank at the time of closure and an estimate of the volume of this material.

Response to comment L-7-28: Section 7.1.4 of the EIS presents a discussion of the Environmental Restoration Program and its interactions with the HLW tank closure program.

Response to comment L-7-29: The performance objectives for the HLW tank closure program were developed through an evaluation of all applicable or relevant and appropriate requirements, which is the same process required under CERCLA and RCRA. Therefore, it is unlikely that the performance objectives would be revised during the performance of Environmental Restoration activities.

Response to comment L-7-30: See response to comment L-2-1.

Response to comment L-7-31: The assumed volume of residual waste remaining in each closed HLW tank if the tanks are cleaned is presented in Table C.3.1-2 of Appendix C. The volume of waste in Tank 20 after spray washing was about 1,000 gallons (P. D. d'Entremont and J. R. Hester, "Characterization of Tank 20 Residual Waste," WSRC-TR-96-0267, March 17, 1997) which also presents the measured radiological and non-radiological composition of the residual material. In each tank, an inventory has been estimated for over 30 radionuclides and many non-radioactive constituents (also in Tables C.3.1-1 and C.3.1-3 of Appendix C). These estimates were compared to the results of analysis of the samples of the residual material and the results showed that the estimates were in good agreement with the sampling results. Section 2.1 of the EIS has been revised to include this reference. Table C.3.1 has been revised to present the average concentration for each listed radionuclide (curies/gallon).

Response to comment L-7-32: Concerns about potential criticality would not preclude using oxalic acid for tank cleaning. However, any use of oxalic acid must be thoroughly evaluated for criticality concerns. This evaluation must be done on a tank-by-tank basis to account for variations in waste characteristics, tank internal geometry, and waste removal technology. The evaluation may result in the identification of additional tank specific controls and/or compensatory measures to ensure prevention of criticality. DOE expects that it would be possible to use oxalic acid safely if it is determined to be necessary, but it is premature to do the detailed analysis necessary to define measures needed to allow its use for specific tanks. A bounding evaluation covering all tanks would not be meaningful and is not necessary to ensure safety. In summary, it is not inconsistent to state that the use of oxalic acid is restricted, yet to assume that it could be used to further clean the tanks.

Response to comment L-7-33: See response to comments L-2-8 and L-14-4 regarding DOE's estimates of the volume and characteristics of the residual material remaining in the closed HLW tanks. As noted in that response, DOE has added Table C.3.1-2, which lists the assumed volume of residual waste in each closed HLW tank if the tanks are cleaned (actual measured volume for Tanks 16, 17, and 20) to Appendix C of the EIS. This new table provides the information requested in the comment and is a more appropriate location for this information than Table 2-1 as suggested in the comment.

Response to comment L-7-34: A new paragraph was inserted at the end of Section 2.1 starting with the sentence "Cleaning of the secondary containment…" It states that: "Most likely, the waste would be removed from the annulus using water and/or steam sprays, perhaps combined with a chemical cleaning agent, such as oxalic acid."

Response to comment L-7-35: The sentence that follows the one referred to by the commenter explains that, "Because nitrates are very mobile in the environment, these large quantities of nitrate would adversely impact the groundwater near the tank farms in the long term," indicating the environmental concern.

Response to comment L-7-36: The environmental impacts of delayed tank closure would be the same as the No Action Alternative impacts in the short term for the duration of the delay. These impacts are described in Section 2.1.4.2. See also response to comment L-7-38.

Response to comment L-7-37: DOE does not intend to conduct demonstrations of known technologies at this time.

Response to comment L-7-38: In the short term, No Action would be equivalent to delayed closure because in both cases the tanks would be managed to protect human health and safety for a period of institutional control, at least during the active operations of other missions at the SRS. The impacts of structural failure of the tanks at 100 years and consequent release of residual waste to the groundwater are described in Section 2.4.2 of this EIS.

Response to comment L-7-39: See response to comment L-7-6. Also, note that these impacts (from the low-activity waste vaults) would occur at the E-Area Vaults Facility, not the tank farm areas.

Response to comment L-7-40: Accidents are described in Section 2.4.1. Additional details are provided in Section 4.1.12 and Appendix B. Those accidents involving natural phenomena, such as a design basis seismic event during cleaning, are assumed to occur during the period of tank closure activities (i.e., at times of active handling of contaminated material). These short-term seismic or other natural phenomena events would not result in higher releases if modeled as part of the long-term impacts. In addition, no credit is given for the structural integrity of the tanks after 100 years (Scenarios 1 and 3) or 1,000 years (Scenario 2 and 4). A seismic event that would be severe enough to fail the tank top, grout and basemat before the postulated failure after 1,000 years would have a very small probability of occurrence (and would be even lower for the 100-year period). Therefore, the risk associated with this accident would be very small compared to the risk from a release that is assumed to occur (probability of 1) after either 100 or 1,000 years.

Response to comment L-7-41: For clarity, the phrase, "with the exception of the safety hazard of collapsed tanks under the No Action Alternative," has been added to the sentence after the word "therefore" in Section 2.4.2.

Response to comment L-7-42: The cited paragraph in Section 2.4.2 has been revised to present the average annual dose that is equivalent to the calculated maximum lifetime dose. This annual dose is then compared to regulatory standards and natural background radiation dose.

Response to comment L-7-43: Comment noted.

Response to comment L-7-44: The existing HEPA-filtered ventilation system would be utilized to the extent practicable during closure activities. This practice would provide an extra margin of safety at minimal extra cost, regardless of the level of internal contamination detected.

Response to comment L-7-45: Long term impacts of the alternatives are described in Section 4.2 of the EIS; in Section 4.1, Short-Term Impacts, only impacts in the short term are discussed. In Section 4.2, impacts of the Clean and Remove alternative in regard to disposal of the tank systems as low-level waste are given by reference to the SRS Waste Management EIS. They are summarized in the third paragraph of Section 4.2 of the EIS.

Response to comment L-7-46: Tables 4.1.10-1 and 10-2 estimate waste generated in the short term by implementation of each of the alternatives. No wastes would be generated because no cleaning would take place under the no action alternative in the short term.

Response to comment L-7-47: Consequences of accidents involving the No Action Alternative have been postulated over the 30-year period covered by short term impacts. Under the No Action Alternative, after bulk removal of waste has occurred (a process that is common to all alternatives and outside the scope of the EIS) the tanks would not be actively managed and an accident involving a natural phenomenon, such as a seismic event, could possibly result in failure of the tank, with concurrent release of contaminants to soil below the tank. Also see the response to comments L-7-40 and L-7-80.

The long-term impacts analysis for No Action assumes that the tanks fail after the 100-year institutional control period, a failure which is not assumed to require an accident initiator. To affect the estimated risk from No Action, any accident that would accelerate such failure would have to be assumed to occur before 100 years. Such an early failure would not contribute significantly to long term risks due to the long transport times in groundwater relative to the assumed 100-year pre-failure period.

Response to comment L-7-48: See the response to comment L-7-45.

Response to comment L-7-49: DOE analyzed the long-term impacts of transport of iron from the HLW tanks in Appendix C of the EIS (see Table C.4.1-19). Tables 4.2.2-6, 4.2.2-7, and 4.2.2-8 present a summary of the detailed analyses in Appendix C.

Response to comment L-7-50: The commenter is correct in that plutonium (and other radionuclides) may not reach the seepline within the 10,000-year period of analysis. As indicated in the response to comment L-3-16 regarding the basis for the 10,000-year period of analysis, this period was chosen to conform to regulatory guidance, and because the value of projecting beyond it is low.

Response to comment L-7-51: Section 4.2.5, "Public Health" is contained within the larger Section 4.2, which is entitled "Long-Term Impacts." Therefore, no change to the title of Section 4.2.5 is necessary.

Response to comment L-7-52: The following new introductory text regarding the scope and purpose of this section has been added: "The purpose of this section is to identify the boundaries (both in space and time) of DOE's cumulative impacts analysis."

Response to comment L-7-53: The reference to the specific company in the Section "Spatial and Temporal Boundaries" of Chapter 5 has been deleted.

Response to comment L-7-54: Table 5-2 presents the offsite impacts of atmospheric emissions. The Composite Analysis presents long-term impacts from releases to groundwater and surface water and is presented in Section 5.7 of the EIS.

Response to comment L-7-55: As described in Section 7.1.1, DOE undertook a comprehensive review of requirements and guidance to identify environmental protection standards. That review is documented in Appendix B of the General Closure Plan (DOE 1996), which was updated in 2000 (DOE 2000). DOE will define tank-specific performance objectives that are consistent with these environmental protection standards. DOE expects the groundwater protection standards to be the most limiting performance objectives for HLW tank system closures. The example cited in Section 7.1.2 (the 4 mrem/year dose limit for beta-gamma radioactivity) is one of these groundwater protection standards (see Table 7-3 of the EIS for other examples). Section 7.1.2 uses the groundwater protection standards to illustrate how the environmental protection standards are used to establish tank-specific performance objectives. Table 7-4 illustrates how the performance objectives would be allocated to individual tanks to ensure that the impacts from all sources affecting a particular media (e.g., groundwater) would comply with the relevant standards. Section 7.1.2 has been revised to present compliance with drinking water standards at the seepline as the example.

Response to comment L-7-56: The second sentence of the second paragraph under Sections A.3.1 and E.2 have been revised to read "The leaked waste is kept dry by air circulation, and, based upon groundwater monitoring results, there is no evidence…."

Response to comment L-7-57: The reference was added to Sections A.3.1 and E.2, and to the list of references for these appendices. See response to comment L-7-65.

Response to comment L-7-58: A reference to the Annual Radioactive Waste Tank Inspection Program has been added.

Response to comment L-7-59: In response to comment L-7-11, a new paragraph describing tank cracking has been added to Section 1.1.3.

Response to comment L-7-60: The word "thee" has been changed to "these."

Response to comment L-7-61: Sections A.3.1 and E.2 have been revised to read, "DOE removed some waste from the annulus at that time, but some dry waste still remains in the annulus."

Response to comment L-7-62: Rather than add a table to the EIS, a reference to the Federal Facility Agreement for the Savannah River Site (EPA 1993) has been added.

Response to comment L-7-63: DOE believes that these sources external to the tanks would not contribute significantly to the dose reported in this EIS for tank closure for the following reasons:

(1) The sizes of these spills are small, compared to the residual tank contents.

(2) The contamination is outside the tanks and would thus transport through the soil and groundwater much more rapidly than those contaminants bound inside the tanks. This would cause their impacts to be noncoincident in time with those from tank closure.

(3) Contamination outside the tanks would be addressed in the CERCLA closure of the tank farm areas. Tank closure and CERCLA closure are being coordinated so that cumulative impacts

are within limits established with SRS regulators through the risk-based closure process. Therefore, if any spill appears to produce a large contribution, it would be remediated until it produces a small contribution.

DOE has revised Sections A.3.1 and E.2 to incorporate this text.

Response to comment L-7-64: As noted in the EIS, the source of information for the first leak was Odum 1976. The source of information for the second is P. D. d'Entremont, "Written Report on Contingency Plan Activation," WSRC-RP-89-259, May 17, 1989. Based on a radiation survey of the soil surrounding the leak site, the leaked mass was estimated to be about 50 pounds, or about 5 gallons. The survey was conducted on April 27, 1989. A reference to this latter study has been added to this paragraph.

Response to comment L-7-65: The reference is W. L. Poe, "Leakage from Waste Tank 16: Amount, Fate, and Impact," DP-1358, 11/74, and was inserted after the sentence ending" . . . Tens of gallons of waste leaked into the soil."

Response to comment L-7-66: The intent of the sentence was not to indicate leaks were unlikely but to indicate that it was unlikely that leaks would be undetected. The paragraph has been expanded as follows: "Because all tanks at SRS have leak detection, it is unlikely that any large leaks have occurred that have not been detected. In eight tanks other than Tank 16, observable amounts of waste have leaked from primary containment into secondary containment. These tanks are managed to ensure that the leaked waste remains dry and immobile. The waste in the annuli of these tanks has been observed carefully over a period of years and minimal movement of the waste has been observed. Other than Tank 16, there is no evidence that waste has leaked from a tank into the soil."

Response to comment L-7-67: See response to L-7-66.

Response to comment L-7-68: True. See response to comment L-7-25.

Response to comment L-7-69: Sections A.3.2, 1.1.3, and E.3 now state "Because of the radioactivity emitted from the waste, the evaporator systems are either shielded (i.e., lead, steel, or concrete vaults) or placed underground."

Response to comment L-7-70: Production capacity can be expressed in overheads production per unit time, feed rate, throughput rate, etc. The EIS was merely giving a sense of the size of the evaporator and thus the volume of the evaporator vessel was used. Section A.3.2 has been extensively revised to provide an updated description of the SRS HLW evaporator systems and no longer presents a specific evaporator capacity.

Response to comment L-7-71: The last sentence of Sections A.3.2 and E.3 have been revised as follows: "…volume by successive evaporation of liquid supernate. This concentrated waste crystallizes into a solid salt cake, which reduces its mobility."

Response to comment L-7-72: The expected inventory of radionuclides after waste removal is shown in Tables C.3.1-1 (total radioactivity) and C.3.1-2 (volume). Table C.3.1-2 was added to the Final EIS to help address concerns such as those expressed in this comment.

Response to comment L-7-73: The first sentence of Sections A.3.5 and E.6 have been revised to state: "The waste streams generated by the F- and H-Area Canyons form insoluble and highly radioactive metal hydroxides (manganese, iron, and aluminum) that settle to the bottom of the waste tanks to form a sludge layer."

Response to comment L-7-74: Section A.4.1 references other EISs that have addressed waste removal from the HLW tanks, the subject of this section. Section A.4.1 then goes on to describe waste removal priorities and techniques. The other EISs do not address heel removal.

Response to comment L-7-75: See response to comment L-5-3.

Response to comment L-7-76: In the third paragraph of A.4.3, reference is made to the Annual Radioactive Waste Tank Inspection Program - 1999 (to support the presence of salt deposits). Past demonstrations have shown that these salts are relatively easily dissolved with water.

As noted in Section A.4.3 of the EIS, the Tank 16 annulus waste contains sand and compounds that formed when the sand mixed with the salt. This mixture makes the waste more difficult to dissolve than if it were purely salt.

Response to comment L-7-77: The following two sentences have been added after the second sentence: "More than 99.9 percent of the original volume of sludge was removed during cleaning (approximately 10 kilograms of solid material was left). Based upon sample results, approximately 830 curies of strontium-90 (the predominant radionuclide) remained."

Response to comment L-7-78: The conceptual design for the Clean and Remove Tanks Alternative is not developed and a definitive description cannot be provided. Because of the high radiation levels, any removal and packaging activities would have to be accomplished remotely. What is provided are advantages and disadvantages inherent to the scope of work that would be required to carry out this alternative so that impacts can be understood.

Response to comment L-7-79: Comment noted. Detailed discussions of specific environmental restoration activities are beyond the scope of this EIS.

Response to comment L-7-80: The different treatment of short-term and long-term impacts of accidents is clarified in the Final EIS in Section 4.1.12 and Section C.1.5 in Appendix C.

The following text was added to Section 4.1.12: "Accidents are explicitly analyzed as part of short-term impacts, and are postulated to occur during the storage, cleaning, transfer, or processing operations conducted prior to final tank closure. While accidents are not considered explicitly as part of the long-term impacts, any accident leading to post-closure tank failure would result in the same long-term impacts described in Section 4.2 and Appendix C."

Also, the following explanation was added to Appendix C as Section C.1.5: "Because the tanks are assumed to fail after either 100 (Scenarios 1 and 3) or 1,000 years (Scenarios 2 and 4), the probability of a release from the tanks is one (i.e., it is assumed that the tank will fail). If an accident severe enough to cause tank failure were to occur before the 100- to 1,000-year post-closure periods, the impacts would not be significantly different than the calculated long-term impacts for the following reasons. First, the probability of such an accident occurring in the first 100 or 1,000 years post-closure would be much smaller than one. Therefore, any impacts from accidents that cause tank failures to occur prior to 100 or 1,000 years would have to be multiplied by this small probability of premature failure. Second, due to the long transport times of the contaminants in groundwater, the difference between the impacts from an early release would be insignificant compared to the calculated impacts based on releases occurring at 100 or 1,000 years."

Response to comment L-7-81: The statements in Section B.2.2 apply to both surface runoff and underground releases only in that accidental releases during operation (30 years) and the subsequent period of active institutional control (100 years) would not result in radiological impacts offsite. Section B.2.2 explains why this is the case. Mitigation actions would prevent offsite human exposures from releases to the surface, and any materials released to subsurface waters during the period of active institutional control would take a long period to reach the potential human receptors. As stated in the last sentence of the first paragraph in this section, the potential long-term consequences of subsurface releases are considered in the EIS assessment of long-term impacts (i.e., in Appendix C). The response to comment L-1-9 discusses the potential long-term impacts of releases to the surface environment under the No Action Alternative. For the action alternatives, surface releases over the long term are not a potential source of impacts because the tanks would be isolated from the surface environment following their closure.

Response to comment L-7-82: Under the No Action Alternative, during the short term, DOE would continue to manage the tank farms, but not close any tanks. This means that normal operations would be conducted in accordance with approved safety analyses. During this period of time, the tanks would not be abandoned, but actively managed to ensure worker and public health and safety. In-tank generation of hydrogen may be an issue in the highly concentrated radioactive waste contained in the tanks prior to bulk waste removal; however, that condition would not exist for the actions in the scope of this EIS. The impacts from each alternative are evaluated assuming bulk removal has already been done. Under these conditions, the amount of hydrogen that could be generated internally would be insufficient to support combustion.

Response to comment L-7-83: For short-term impacts analysis, the impacts of accidents involving temporary losses of containment can be classified as either leaks or spills. The impacts of loss of containment would be bounded by the transfer error scenario (Section B.3.1.2), which would result in a large release of liquid to the environment with subsequent airborne release by evaporation. The last sentence in the first paragraph of Section B.3.1.2 has been revised to state "This scenario would bound all leak/spill events, including loss of containment."

Response to comment L-7-84: Section B.3.1.3 actually addresses vehicle impact. The comment would more appropriately apply to Section B.3.1.5, Seismic Event. Underground releases resulting from seismic events are not separately analyzed because their impacts would be similar to the long-term impacts from tank failures that are considered in Appendix C. Short-term impacts from seismic events are limited to those that cause releases of material to the surface. The fact that it may be unlikely that immediate action would be taken to mitigate the release following a seismic event due to competing priorities is also taken into consideration in the analysis. The last sentence in Section B.3.1.5 starts by stating, "If mitigation measures are not taken..." Also, see the response to comment L-7-80.

Response to comment L-7-85: The failure of the salt solution hold tank would be in fact a liquid release. However, the only pathway for short-term off-site exposure would be through the evaporation of this liquid, as postulated in the scenario. Any portions of the liquid spill that are not cleaned up would contribute to the long-term impacts addressed in Appendix C. There could be some exposure of SRS workers to this spilled salt solution. However, DOE anticipates that the human health consequences would be minimal because of the application of standard radiological control practices, such as posting, monitoring, and access control.

Response to comment L-7-86: Section B.3.2.1 addresses flooding as a potential contributing factor to long-term impacts and directs the reader to the analysis of long-term impacts (contained in Appendix C). While flooding is not explicitly mentioned in Appendix C, it is one of several potential mechanisms that may cause the tanks to fail after 100 years. The tanks are assumed to fail after 100 years (No Action Alternative) or 1,000 years (Stabilize Tanks Alternative) regardless of the initiating event (whether it be seismic, flooding, corrosion, or other mechanism). The analysis of long-term impacts following a tank failure will bound the impacts from tank failures caused by flooding.

Response to comment L-7-87: This paragraph (the third paragraph in Appendix C) has been deleted.

While DOE does not envision relinquishing control of the area in or near the Tank Farms, it recognizes that there is uncertainty in projecting future land use and effectiveness of institutional controls considered in this EIS. For purposes of analysis, DOE assumes direct physical control in the General Separations Area only for the next 100 years. In accordance with agreements with the State of South Carolina and as reflected in the *Industrial Wastewater Closure Plan for F-*

and H-Area High-Level Waste Tank Systems, DOE has calculated human health impacts based on doses that would be received over time at a point of compliance that is at the seepline, about a mile from the tank farms. However, recognizing the potential for exposure to groundwater and the fact that DOE's land use assumptions may be incorrect, DOE has also provided estimates of human health implications of doses that would be received directly adjacent to the boundary of the tank farm. This location is much closer to the tank farm than the point of compliance and the projected doses and consequent health effects are greater. Section 4.2.4 of the EIS describes the long-term land use impacts of the residual radioactive and non-radioactive material in the closed HLW tanks.

Response to comment L-7-88: The intruder was assumed to be a teenager for consistency with EPA Region 4 assessment guidance. All parameter values used in the long-term dose assessment modeling presented in Appendix C are consistent with this assumption.

Response to comment L-7-89: DOE believes that its rationale for not performing analysis for the atmospheric release pathway is valid and appropriate.

Response to comment L-7-90: As described in Section C.2.1.2, the Nearby Adult Resident/Nearby Child Resident are assumed to ingest surface water. To clarify this point, the word "incidental" has been deleted from the sixth bullet in the discussion of receptors.

Response to comment L-7-91: Based on engineering judgement, DOE believes that the assumption of 20% of the inventory in ancillary equipment is conservative. The impacts presented in the EIS include the 20 percent inventory as part of the analysis. Presenting the impacts of the ancillary equipment separately is not appropriate because the tank closure process would close the tank with its ancillary equipment. Section 4.2.2.2 has been revised to more clearly state the assumptions regarding residual material in piping and ancillary equipment.

Response to comment L-7-92: The doses were calculated based on 1,000 gallons of sludge in second-cycle tanks and 100 gallons of sludge in first-cycle tanks. The residual left behind after waste removal is primarily sludge. For example, Tank 20 was a salt receiver that never received sludge, but the residual after waste removal was about 1,000 gallons of a sludge-like material. The 5 curies/gallon number quoted by the Commenter is characteristic of Cs-137 in supernate. Sludge levels of Cs-137 are lower.

Response to comment L-7-93: The Draft EIS Appendix D, Public Scoping summary, has been replaced in the Final EIS with Appendix D, Response to Public Comments (on the Draft EIS). However, as indicated in the Comment Response referred to by the commenter, the EIS discusses potential impacts to a hypothetical resident who consumes fish exposed to contaminants from the tanks in Section 4.1.8 of the EIS. The assumptions regarding the calculations are described in Appendix C.

As the comment response indicated, and the commenter acknowledged, DOE used available information from the closure of Tanks 17 and 20 in preparing the EIS. The information is relevant to several sections of the EIS. Therefore DOE did not consolidate the information in a single section of the EIS. Lessons learned included grout emplacement methods, tank system isolation, and occupational radiation protection.

Drew Grainger

01/23/01 09:53 AM

To: L Ling/DOE/Srs@Srs, John Knox/DOE/Srs@Srs, Howard Gnann/DOE/Srs@Srs
cc: Jeffrey Allison/DOE/Srs@srs
Subject: Comments on DOE/EIS-0303

fyi
----- Forwarded by Drew Grainger/DOE/Srs on 01/23/01 09:54 AM -----

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01/23/01 09:23 AM

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Rec.
JAN 23 2001
jmk

Thank you for the opportunity to comment on "The Savannah River Site (SRS) High-Level Waste Tank Closure Draft Environmental Impact Statement (EIS), Aiken, South Carolina (DOE/EIS-0303)". Mr. Cliff Blackman of this office has already submitted comments; these comments are supplemental to Mr. Blackman's.

The referenced document, in its current form, is inadequate to determine the acceptability of DOE's proposed action or any of the alternatives. The document does not contain information sufficient to confirm DOE's estimate of residual activity (i.e. "source term"), and independent estimates by this Department indicate that DOE's estimate of residual radioactivity may be low by a factor of 20 or more. For example, a residual of 3,000 gallons of sludge in each tank which currently has a sludge inventory (consistent with tank washing results from Tanks 16 and 17) would result in residual radioactivity some 20 times greater than the estimate presented in the DEIS in Table C.3.1-1 (the only estimate of residual activity presented in the DEIS). This increased source term would result in increased dose to members of the general public, and would call DOE's ability to meet tank closure performance standards into question. L-8-1

The use of oxalic acid to clean waste tanks is treated in an inconsistent manner in the DEIS. On one hand, DOE states that "oxalic acid cleaning of any waste tank is prohibited." (p. 2-2). On the other hand, the DEIS states that "DOE expects that oxalic acid cleaning would be required on tanks that contain first-cycle wastes, the most highly radioactive waste in the tanks". The DEIS should present on a tank-by-tank basis, DOE's estimate of residual radioactivity after bulk removal, bulk removal plus spray water wash, and after oxalic acid spray wash, and long-term dose modeling should be performed for each case. DOE should also include in this analysis significant radionuclides not included in Table C.3.1-1, such as Pu-240, Am-241 and Cm-244, which may increase doses to the general public even further, perhaps by a factor of 100 or more, as indicated in Mr. Blackman's comments. L-8-2

In addition to questioning the source term presented in the DEIS, we question DOE's long term modeling analyses themselves, particularly the assumption that the point of compliance for radionuclides in groundwater is the seepline (i.e. where groundwater seeps out of the ground and into surface streams). By measuring compliance at this point, DOE would de facto preclude the direct use of groundwater for drinking water purposes. The graphic presented in Figure C.1, by not presenting the direct ingestion of contaminated groundwater as a "potential exposure pathway for human receptors" tends to confirm this conclusion. It is unreasonable to conclude that DOE can and will maintain institutional control of the site for the 10,000 year duration of the modeling analysis, and likewise it is unreasonable to exclude direct use of groundwater as an exposure pathway during the 10,000 year modeling timeframe. DOE's proposal for tank closure appears, by using groundwater as a "buffer", to be simply a larger, longer-term version of the use of seepage basins for low-level radioactive waste disposal. That practice is now universally viewed as unacceptable. L-8-3

We welcome the opportunity to review a revised draft EIS which addresses the issues itemized above.

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Response to comment L-8-1: DOE believes that the assumed source term values are appropriate for use in this EIS. As discussed in the response to comment L-7-18, Appendix C has been revised to present a table listing the assumed volume of residual waste remaining in each closed HLW tank if the tanks are cleaned. These assumed volume estimates are based on previous experience with closure of Tanks 17 and 20 and on judgments of the effectiveness of the waste removal method. For example, in Tanks 17 and 20, the depth of the solids was estimated at various points in the tank by comparing the sludge level to objects of known height.

The characteristics of this residual sludge were based on knowledge of the processes that generated the waste. It was assumed that the residuals left behind after waste removal would have approximately the same composition as the sludge currently in the tanks. Before each tank is closed, the residual in that tank will be estimated and modeled to ensure that the closure is within requirements. In Tanks 17 and 20, the two tanks that were closed, this was done by separately estimating the volume and composition of the waste, and then combining these two pieces of information to develop tank inventories of each species of interest. A similar procedure will be followed in the future for waste residual in each tank.

Response to comment L-8-2: For use of oxalic acid, see response to comment L-4-23. For residual radioactivity, see response to comment L-8-1.

The radionuclides listed in the comment were included in DOE's long-term fate and transport modeling and are factored in the calculated alpha concentration and total dose values. However, those radionuclides are not listed in Table C.3.1-1 because this table was intended to present those radionuclides that constitute the majority of the calculated radiation dose.

Response to comment L-8-3: While DOE does not envision relinquishing control of the area in or near the Tank Farms, it recognizes that there is uncertainty in projecting future land use and effectiveness of institutional controls considered in this EIS. For purposes of analysis, DOE assumes direct physical control in the General Separations Area only for the next 100 years from the date of tank closure. In accordance with agreements with the State of South Carolina and as reflected in the *Industrial Wastewater Closure Plan for F- and H-Area High-Level Waste Tank Systems*, DOE has calculated human health impacts based on doses that would be received over time at a point of compliance that is at the seepline, about a mile from the tank farms. However, recognizing the potential for exposure to groundwater and the fact that DOE's land use assumptions may be incorrect, DOE has also provided estimates of human health implications of doses that would be received directly adjacent to the boundary of the tank farm. This location is much closer to the tank farm than the point of compliance and the projected doses and consequent health effects are greater. Section 4.2.4 of the EIS describes the long-term land use impacts of the residual radioactive and non-radioactive material in the closed HLW tanks.

The EIS presents results in groundwater downgradient from the tank farms at the 1-meter well, the 100-meter well, and the seepline. The point of compliance at the seepline is based on two factors: (1) the General Separations Area where the tank farms are located precludes residential use as described by the Savannah River Site Land Use Plan and in Section 4.2.4 of the EIS and (2) this point of compliance is agreed upon with the SCDHEC.

Drew Grainger

To: L Ling/DOE/Srs@Srs, youngp@ttnus.com, John Knox/DOE/Srs@Srs
cc: Donna Martin/WSRC/Srs@Srs
Subject: Tank EIS Comment

12/06/00 12:30 PM

Mr. Frank Watters called the toll-free line and wanted to submit comments on the tank EIS. I called him back and discussed the EIS with him.

Mr. Watters said he was one of the "original 17" duPont employees assigned to the Savannah River project in Wilmington in 1951, and was author of the design data report for the tank farms. He worked at SRP from 1953 to 1981, when he retired.

He had one comment:

Add to the list of acronyms HDB and FDB - H Diversion Box and F Diversion Box. They are in the legend for the tank farm drawings but he felt they should be in the acronym list, too. L-9-1

He had one question, which we should treat as a comment:

There are two parallel waste headers (a redundancy) from the canyons. They are in concrete casements. How will these (and other waste transfer lines) be closed? Would some lines be grouted into the tanks and disposed of that way? L-9-2

He also observed that he would have picked the preferred alternative as the closure method. L-9-3

Response to comment L-9-1: The figure has been extensively revised and no longer contains the referenced terms.

Response to comment L-9-2: Closure of these and similar components will be addressed case by case in a specific closure module for each tank. One option would be to flush these transfer lines and grout them in place.

Response to comment L-9-3: Comment noted.

Drew Grainger

01/24/01 01:03 PM

To: L Ling/DOE/Srs@Srs, George Hannah@Srs, John Knox/DOE/Srs@Srs
cc:
Subject: Comments - Draft Tank Closure EIS

----- Forwarded by Drew Grainger/DOE/Srs on 01/24/01 01:05 PM -----

NEPA

01/24/01 12:59 PM

To: Drew Grainger/DOE/Srs
cc:
Subject: Comments - Draft Tank Closure EIS

cc:Mail Forwarding Information
--------------- cc:Mail Forwarded ---------------
From: "Ernest S. Chaput" <ESandC@prodigy.net> AT SRS
Date: 01/24/2001 11:49 AM
To: "Andrew R. Grainger" <nepa@mailhub.srs.gov> AT SRS
Subject: Comments - Draft Tank Closure EIS

Forward Header
Subject: Comments - Draft Tank Closure EIS
Author: "Ernest S. Chaput" <ESandC@prodigy.net> at SRS
Date: 1/24/01 11:49 AM

Dear Mr. Grainger:

I have two comments on the Draft Environmental Impact Statement High-Level Waste Tank Closure (DOE/EIS-0303D):

Comment No. 1:

There appears to be an inconsistency in the evaluation of the alternatives. In the preferred "Clean and Stabilize" alternative, it is stated that oxalic acid cleaning could be required on as many as three-quarters of the tanks to meet performance objectives.

For the "Clean and Remove" alternative the document states that cleaning techniques such as oxalic acid might be required to reduce worker exposure during tank removal operations. The draft EIS then states that DOE considers these additional actions are "not technically and economically feasible within the meaning of DOE Order 435.1" because of criticality safety and possible interference with downstream processing activities. L-10-1

It appears that DOE is stating that oxalic acid is acceptable for the preferred grout option but, without explanation, is unacceptable for the removal option. This apparent inconsistency and source of confusion should be corrected. L-10-1

Comment No. 2:

All closure options are predicated upon removing sufficient waste from each tank so that the safety and environmental "performance objectives" will be met. However, the draft EIS does not describe the process by which the amount of waste remaining in each tank (the source term) will be determined - either in volume or curies. It is unclear whether the "source term" will be determined/ estimated by measurement or by analysis without measurement. The EIS should describe the process that will assure that the source term (and follow-on safety and environmental impacts) reflect the actual conditions in each tank prior to closure. L-10-2

Thank you for the opportunity to comment on this draft EIS.

Ernest S. Chaput
108 Cherry Hills Drive
Aiken, SC 29803

803-648-5402

Response to comment L-10-1: See response to comment L-4-23.

Response to comment L-10-2: See response to comment L-7-5.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
and Prevention (CDC)
Atlanta GA 30341-3724

December 18, 2000

Rec.
DEC 22 2000

Andrew R. Grainger, NEPA Compliance Officer
U.S. DOE, Savannah River Operations Office
Building 742A, Room 183
Aiken, South, Carolina 29802

Dear Mr. Grainger:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for the Savannah River Site, High-Level Waste Tank Closure Draft Environmental Impact Statement (DOE/EIS-0303D), Aiken, SC. We are responding on behalf of the U.S. Public Health Service, Department of Health and Human Services. Technical assistance for this review was provided by Dr. Robert C. Whitcomb, Radiation Studies Branch, National Center for Environmental Health, Centers for Disease Control & Prevention.

This DEIS provides an evaluation of three alternatives regarding the HLW tanks at the SRS. The document appears to be well documented, organized, and referenced. However, there are some inconsistencies in projected doses and risks as reported in tables throughout the document. The recommendations are attached in a memo to me from Dr. Whitcomb. Please consider the attached comments as you prepare the Final EIS. If you should have any questions regarding these technical comments, you may contact Dr. Whitcomb directly at (404) 639-2517.

Thank you for the opportunity to review and comment on this DEIS. Please send us a copy of the Final EIS, and any future environmental impact statements which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely,

Kenneth W. Holt

Kenneth W. Holt, MSEH
National Center for Environmental Health (F16)

attachment

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Centers for Disease Control

Memorandum

Date December 8, 2000

From Robert C. Whitcomb, Jr., Physical Scientist, National Center for Environmental Health, Division of Environmental Hazards and Health Effects, Radiation Studies Branch

Subject Review of the "Savannah River Site, High-Level Waste Tank Closure Draft Environmental Impact Statement" (DOE/EIS-0303D, November 2000)

To Ken Holt, Environmental Health Scientist, Emergency and Environmental Health Services, National Center for Environmental Health

This memorandum provides a review that focuses on the public health consequences associated with several proposed alternatives for closure of 49 high-level waste (HLW) tanks at the Savannah River Site (SRS). This Environmental Impact Statement (EIS) evaluates three alternatives regarding the HLW tanks at the SRS. The three alternatives are to clean and stabilize tanks, clean and remove tanks, or no action. Three options are considered for tank stabilization: Fill with Grout (Preferred Alternative); Fill with Sand; or Fill with Saltstone. Overall, this EIS is well documented, organized, and referenced. However, there are some inconsistencies in projected doses and risks as reported in tables throughout the document. Recommended changes to these inconsistencies would improve the document as follows.

Specific Comments

1. Page 2-12, Table 2-2 Summary comparison of short-term impacts by tank closure alternative.

   The table value for the noninvolved worker dose from the fill with saltstone alternative is 2.6×10^{-3} mrem/yr. L-11-1

   This value should be 2.7×10^{-3} mrem/yr, which is consistent with higher dose estimates from this alternative as listed in Table 4.1.8-1, page 4-17.

2. Page 2-13, Table 2-2 Summary comparison of short-term impacts by tank closure alternative.

   a. The table value for the maximally exposed offsite individual dose from the fill with saltstone alternative is 5.0×10^{-5} mrem/yr. L-11-2

      This value should be 5.2×10^{-5} mrem/yr, which is consistent with summing the dose estimates for both the H-area and F-area tank farms (e.g., 2.6×10^{-5} mrem/yr + 2.6×10^{-5} mrem/yr = 5.2×10^{-5} mrem/yr).

Page 2 – Mr. Ken Holt

b. The table value for the noninvolved worker estimated latent cancer fatality risk from all alternatives is 5.1×10^{-5}.

This value should be 5.3×10^{-8} (*a thousand-fold difference*) for the fill with saltstone alternative and 5.1×10^{-8} for the other alternatives. This is consistent with summing the dose estimates for both the H-area and F-area tank farms (e.g., 2.6×10^{-3} mrem/yr + 2.6×10^{-3} mrem/yr = 5.2×10^{-3} mrem/yr), multiplying by the number of years to complete the work (24.5) on 49 total tanks at the rate of two tanks per year (e.g., 5.2×10^{-3} mrem/yr x 24.5 years = 1.3×10^{-1} mrem), converting mrem to rem (e.g., 1.3×10^{-1} mrem x 0.001 rem/mrem = 1.3×10^{-4} rem), and multiplying by the worker risk coefficient (e.g., 1.3×10^{-4} rem x 4.0×10^{-4} risk/rem = 5.1×10^{-8}). L-11-3

3. Page 2-18, Table 2-3 Estimated accident consequences by alternative.

The table values for the latent cancer fatalities for the maximally exposed offsite individual are 4.8×10^{-5}, 9.6×10^{-5}, 1.7×10^{-7}, 4.8×10^{-5}, and 9.6×10^{-5} respectively.

These values should be 6.0×10^{-5}, 1.2×10^{-4}, 2.1×10^{-7}, 6.0×10^{-5}, and 1.2×10^{-4}. Apparently, the authors incorrectly used the worker risk coefficient (4×10^{-4} risk/rem) for the maximally exposed offsite individual instead of the population risk coefficient (5×10^{-4} risk/rem). L-11-4

4. Page 2-23, Table 2-4 Summary comparison of long-term impacts by tank closure alternative.

The table value for the adult resident latent cancer fatality risk for the fill with grout alternative is 2.0×10^{-6}.

This value differs from the 3.9×10^{-7} value listed in Table 4.2.5-2 page 4-49 and Table S-3, page S-23 of the Summary document. Calculating the risk based on a 0.7 mrem dose estimate produces a risk number of 3.5×10^{-7} (e.g., 0.7 mrem x 0.001 rem/mrem x 5×10^{-4} risk/rem = 3.5×10^{-7}). L-11-5

5. Page 2-24, Table 2-4 Summary comparison of long- term impacts by tank closure alternative

The table value for the adult resident lifetime dose for the fill with grout alternative is 4 mrem.

This value differs from the 0.7 mrem value listed in Table 4.2.5-2 page 4-49 and Table S-3, page S-23 of the Summary document. L-11-6

Page 3 – Mr. Ken Holt

6. Page 4-11, Table 4.1.3-5 Annual radionuclide emissions (curies/year) resulting from tank closure activities. L-11-7

   Annual emission rates (curies/year) are listed for F-Area, H-Area, and the Saltstone Facility for all alternatives.

   Why are only the Saltstone Facility emission rates found in Table S-2, page S-19 in the Summary document? Shouldn't the F-Area, H-Area, and Total emission rates be listed in Table S-2 also?

7. Page 4-11, Table 4.1.3-6 Annual doses from radiological air emissions from tank closure activities. L-11-8

   The table value for the noninvolved worker dose from the fill with saltstone alternative is 2.6×10^{-3} mrem/yr.

   This value should be 2.7×10^{-3} mrem/yr, which is consistent with higher dose estimates from this alternative as listed in Table 4.1.8-1, page 4-17.

8. Page 4-17, Table 4.1.8-1 Estimated radiological dose and health impacts to the public and noninvolved worker from SRS airborne emissions. L-11-9

   The table values for the latent cancer fatality risk for the maximally exposed offsite individual have exponential values of 10^{-10} for the first two columns and 10^{10} for the remaining columns.

   These exponential values should all be 10^{-10}.

9. Page 4-29, Table 4.1.12-1 Estimated accident consequences by alternative. L-11-10

   The table dose value for the maximally exposed offsite individual from the potential failure of salt solution hold tank (saltstone option only) is 2.1 rem.

   This value probably should be 4.2×10^{-4} rem to be consistent with the values listed in Table 2-3, page 2-18 and Table B-3, page B-9.

10. Page 4-49, Table 4.2.5-2 Radiological results from contaminant transport from H-Area Tank Farm. L-11-11

    The table value for the adult resident latent cancer fatality risk for the fill with grout alternative is 3.9×10^{-7}.

    This value should be 3.5×10^{-7} (e.g., 0.7 mrem x 0.001 rem/mrem x 5×10^{-4} risk/rem = 3.5×10^{-7}).

Response to comment L-11-1: The value in Table 2-2 is correct. The values in Table 4.1.8-1 have been corrected.

Response to comment L-11-2: The value in Table 2-2 is correct. The values in Table 4.1.8-1 have been corrected.

Response to comment L-11-3: The values in Table 2-2 have been updated due to a correction in Table 4.1.8-1.

Response to comment L-11-4: The incorrect risk coefficient was used in the calculation. The correct risk coefficient has now been used and the values have been revised in Table 2-3.

Response to comment L-11-5: The value in Table 2-4 has been corrected.

Response to comment L-11-6: The value in Table 2-4 has been corrected.

Response to comment L-11-7: The original intent was to present the values that discriminate among the alternatives, not to list all of them. However, the total emission rate is more appropriate for this intent and has replaced the values for the saltstone facility in Table S.2.

Response to comment L-11-8: The value in Table 4.1.3-6 is correct. The value in Table 4.1.8-1 has been corrected.

Response to comment L-11-9: The values have been changed to the appropriate order of magnitude in Table 4.1.8-1.

Response to comment L-11-10: The value should be 4.2×10^{-4} rem and has been corrected in Table 4.1.12-1.

Response to comment L-11-11: The value has been corrected in Table 4.2.5-2.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive N.
St. Petersburg, Florida 33702
(727) 570-5317, FAX 570-5300

January 8, 2001 F/SER4:DR:am

Rec.
JAN 16 2001

Mr. Andrew R. Grainger, NEPA Compliance Officer
U.S. Department of Energy
Savannah River Operations Office
Building 742A, Room 183 Attn: Tank Closure EIS
Aiken, South Carolina 29802

Dear Mr. Grainger:

The National Marine Fisheries Service (NMFS) has reviewed the Draft Environmental Impact Statement (DEIS) for the Savannah River Site High-Level Waste Tank Closure, Aiken, South Carolina (DOE/EIS-0303D). Based on our review, we find that the document sufficiently addresses potential impacts to resources for which we have stewardship responsibilities. Although we are concerned over the possibility of unintentional releases of highly toxic chemicals, it appears that great effort has been devoted to ensuring containment of radioactive and other toxic substances. We L-12-1
further note that the planned action is not expected to cause adverse impacts to wetlands or significant diminution in the quality of surrounding aquatic systems, and it is deemed to be the most environmentally sound and least hazardous means for tank closure.

Several agencies, including the NMFS, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and the States of Georgia and South Carolina are jointly and individually examining aquatic resource protection and restoration needs in the Savannah River. These efforts have been initiated as a result of increasing concern over the river's environmental quality and growing recognition of its enormous fishery, natural aesthetic, recreational, power production, and other public interest features. Of particular interest to the NMFS is the river's function as a spawning and nursery site for anadromous fishes including American shad L-12-2
(*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), striped bass (*Morone saxatilis*), Atlantic sturgeon (*Acipenser oxyrinchus*), and shortnose sturgeon (*Acipenser brevirostrum*). Because of their migratory nature, these species utilize significant portions of the river, including sections that would be affected by discharges (if any) from the Savannah River Site. Accordingly, any modification in the selected alternative and associated action that could potentially affect these resources should be disclosed. This includes possible release of toxic materials into tributary waters of the Savannah River.

Finally, in accordance with the Endangered Species Act of 1973, as amended, it is the responsibility of the appropriate federal regulatory agency to review its activities and programs and to identify any activity or programs that may affect endangered or threatened species or their habitat. If it is determined that these activities may adversely affect any species listed as endangered or threatened, formal consultation with our Protected Species Management Branch must be initiated. The appropriate contact person for matters pertaining to protected species is the Assistant Regional Administrator for Protected Resources who may be contacted at the letterhead address. L-12-3

We appreciate the opportunity to review the subject DEIS and to provide comments. Related questions or comments should be directed to the attention of Mr. David Rackley at our Charleston Area Office. He may be reached at 219 Fort Johnson Road, Charleston, South Carolina 29412-9110, or at (843) 762-8574.

Sincerely,

Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

Response to comment L-12-1: Comment noted.

Response to comment L-12-2: Any potential changes in the HLW tank closure program would be disclosed.

Response to comment L-12-3: Comment noted. As noted in Section 3.4.1, no threatened or endangered species or critical habitat occurs in one near the F- and H-Area Tank Farms.

Drew Grainger
01/31/01 09:34 AM

To: L Ling/DOE/Srs@Srs, John Knox/DOE/Srs@Srs
cc:
Subject: Additional Comments on DOE/EIS-0303D

Ecc.
JAN 31 2001

----- Forwarded by Drew Grainger/DOE/Srs on 01/31/01 09:37 AM -----

NEPA
01/31/01 09:34 AM

To: Drew Grainger/DOE/Srs
cc:
Subject: Additional Comments on DOE/EIS-0303D

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   cc:Mail Forwarding Information
--------------- cc:Mail Forwarded ---------------
From:        Cliff Blackman <cliff_blackman@mail.dnr.state.ga.us> AT SRS
Date:        01/26/2001 08:30 AM
To:          nepa@mailhub.srs.gov AT SRS
Cc:          Jim Hardeman <Jim_Hardeman@mail.dnr.state.ga.us> AT SRS
Subject:     Additional Comments on DOE/EIS-0303D



______________________________ Forward Header _________________________________
Subject: Additional Comments on DOE/EIS-0303D
Author:  Cliff Blackman <cliff_blackman@mail.dnr.state.ga.us> at SRS
Date:    1/26/01 8:30 AM
```

Please accept the attached additional EIS comments for review. I apologize for being a couple of days late, but I didn't receive the EIS for review until the end of December.

These comments relate mainly to Kd assumptions used in the MEPAS model. High aluminum values measured in groundwater from E, F, and H Areas suggest a much lower Kd value than used in the model. In addition, the projected groundwater flow from F and H Tank farms to Four Mile Creek will traverse the seepage basins where very low pH values have been reported. This factor, along with the high results for aluminum, suggests that much lower Kd values for soil may apply for groundwater flow south of the water table divide. The implication is that some radionuclides will reach Four Mile Creek sooner, and that higher doses may result, since the radionuclides will not have as much decay time. L-13-1

Other comments relate to possible exponent problems with projected risk calculations (risk > 1E+10) and with possible concentration unit problems for reported concentrations of tritium in groundwater (H-3 = 0.296 mCi/ml in E Area). L-13-2

Thank you for your consideration.

Cliff Blackman (Ga-DNR)

Comments on DOE/EIS-0303D Draft Regarding High-Level Waste Tank Closure

1/25/2001 ... Additional Comments

From: Cliff Blackman, Georgia Department of Natural Resources, Environmental Radiation Program
404/894-2418 or 404/362-2675 (Fax 404/894-3828) ... e-mail Cliff.Blackman@oip.gatech.edu

1) Maximally Exposed Offsite Individual Latent Cancer Risk Exponent Problem:

Table 4.1.8-1 reports this risk as $3.1x10^{10}$ for the H-Tank area options. Presumably this is a typo, as this level of risk would probably require an individual to jump into the waste tank! L-13-3

2) Maximum Groundwater Contaminant Concentration Units Problem:

Tables 3.2-3, 3.2-4, and 3.2-5 report the maximum groundwater contaminant concentrations for parameters in excess of the regulatory limit for E-Area, F-Area, and H-Area, respectively. Likewise, Figure 3.2-5 provides a map of these areas with some of the same results listed. However, there may be a typo or else some confusion over units for tritium. The tables provide tritium concentrations in uCi/ml (micro), whereas the map reports tritium concentrations in mCi/ml (milli). For example, Table 3.2-3 indicates that the maximum tritium concentration in E-Area was $2.96x10^{-1}$ uCi/ml, whereas Figure 3.2-5 indicates that the maximum concentration was 0.296 mCi/ml, which would actually be $2.96x10^{+2}$ uCi/ml or 1000 times higher than reported in the table. Presumably the intent was to report in uCi/ml. L-13-4

3) Projected vs Measured Concentrations of Aluminum in Groundwater and Possible Kd Implications:

Table C.4.1-14 provides the MEPA modeled concentration of aluminum in groundwater for all options under consideration. This table suggests that the aluminum concentration will be less than $1x10^{-6}$ mg/L, which is the same as $1x10^{-3}$ ug/L. However, actual groundwater measurements provided in Tables 3.2-3, 3.2-4, and 3.2-5 indicate that the maximum concentrations measured in E, F, and H Areas are currently $3.67x10^{+3}$, $3.7x10^{+4}$, and $1.3x10^{+4}$ ug/L, respectively. Since the modeled results are over 1,000,000 times lower than currently measured values, doesn't that suggest that the soil Kd values for aluminum (and possibly other nuclides) in groundwater in this area must be much lower than the Kd values used in MEPAS as provided in Table C.3.2-1 (35,300)? L-13-5

4) Groundwater Flow Past Seepage Basins with Low pH and Possible Kd Implications:

Figures 3.2-2 and 3.2-3 indicate that groundwater flow from the F and H Tank Farms on the south side of the divide will intercept closed seepage basins en-route to Four Mile Creek. Groundwater testing in these areas indicated very low pH in some monitoring wells (WSRC-TR97-00322 and WSRC-TR98-00312, Groundwater Data Section). Low pH has been linked with lower Kd values for some radionuclides (<10 for Cs and <1 for Sr as provided in DOE/EIS-0082, p. F-12) and, consequently, more mobility and higher concentrations than would otherwise be predicted, down-gradient. How does the MEPAS model account for this phenomenon? L-13-6

Response to comment L-13-1: See response to comment L-13-5.

Response to comment L-13-2: See response to comment L-13-3.

Response to comment L-13-3: The values have been changed to the appropriate order of magnitude in Table 4.1.8-1.

Response to comment L-13-4: The units shown on Figure 3.2-5 for tritium were incorrect and have been revised (all constituents, in addition to tritium, have been checked and revised as needed).

Response to comment L-13-5: The aluminum concentrations detected in groundwater monitoring wells reported in Tables 3.2-3 through - 5 may represent location-specific conditions (e.g., source terms, release mechanisms, soil chemistry, and groundwater sample characteristics [turbidity]) different from general assumptions used in the MEPAS modeling for the HLW tank farms. For instance, the maximum aluminum concentration of 37,100 micrograms/liter reported in Table 3.2-3 for the F-Area occurred in well FSB77 during the 3rd quarter of 1998 sampling. This well is located adjacent to the F-Area seepage basin and a groundwater pH of 3.4 was reported. This low pH is due to the presence of the seepage basin and is not indicative of natural conditions. This very site-specific condition that may locally affect parameters such as K_d should not overshadow the soil and groundwater chemistry along the entire 6,000 foot groundwater flowpath between the F tank farm and the seepline along Four Mile Creek. Therefore, the values reported in the tables for aluminum (and other constituents) measured during groundwater monitoring conducting in 1997 and 1998 do not suggest that the selected K_d value for aluminum (and other constituents) used in the MEPAS modeling are inappropriate.

The K_d value selected to represent aluminum in the aquifer was taken from data for soils with <10% clay and a pH range of 5 to 9. A review of published reports for the General Separations Area containing descriptions of the site geology, the aquifer formations, soil and groundwater chemistry, and previous modeling efforts was the basis for selecting physical and chemical parameter values that DOE believed were representative of the predominant aquifer conditions across the groundwater flow paths at each of the tank farms. The descriptions of numerous soil core samples from borings in the Upper Three Runs aquifer in the General Separations Area, including the F and H Areas, suggests that the average clay content of the aquifer might be higher than 10%. Because K_d values often increase with an increase in clay content, it is possible that an even higher K_d value than the one used in the modeling could be justified. However, because most groundwater flow and contaminant transport will occur in the most transmissive zone of an aquifer, we have used a K_d for aluminum based on a conservatively low clay content of 10% for the aquifer matrix (generally, in porous aquifers, higher transmissivity is associated with lower clay content).

Response to comment L-13-6: The MEPAS model cannot directly account for a change in K_d over the flow path of the groundwater plume. DOE has allowed for such variations by selecting appropriate K_d values for each radionuclide (and nonradionuclide) migrating through the saturated zone (i.e., through which the plume would migrate beneath the seepage basins enroute to Four Mile Creek) that represents the majority of the aquifer material through which the flow occurs. We recognize that some portion of the flowpath may contain altered chemistry (e.g., low pH at the seepage basins), but on the other hand, a portion of the flowpath may contain offsetting chemistry (e.g., higher than average soil pH). K_d values can also be strongly affected by the clay and organic content of the aquifer matrix.

It should also be noted that most groundwater flow and contaminant transport will occur in the most transmissive zone of an aquifer. At the same time, the most transmissive zone allows for the most flushing of the aquifer with upgradient groundwater that has not been impacted by the low pH conditions locally beneath the seepage basins. This suggests that the most transmissive aquifer zone is less affected by any low pH leachate from the seepage basins and that changes to the K_d of the aquifer would be minimized. Wells demonstrating low pH in the vicinity of the seepage basins may not be screened in the most transmissive section of the aquifer.

Please also note that although a combination of site-specific and literature-based sources for the K_d values were used in the MEPAS modeling, the MEPAS data base indicates that the Kd values for the primary contributors to the radiological dose (i.e., Se-79, Tc-99, C-14, and I-129) do not vary with pH, so no adjustment to the K_d values for these constituents would be necessary to model flow beneath the seepage basins. In addition, the major contributor to the radiological dose, Tc-99, has a relatively low Kd value of 0.36 ml/g. Decreasing this already low K_d value by an order of magnitude (i.e., K_d = 0.036 ml/g) would have no effect on the maximum plume concentration (and doses); only the time of the maximum concentration would change from 750 to 737 years.

Finally, because the low pH conditions occur some distance downgradient of the tank farms, there is no potential to increase the release of constituents from the source zone in the bottom of the tanks, and no potential effects on the 1-and 100-meter well concentration predictions.

Drew Grainger

01/24/01 09:49 AM

To: John Knox/DOE/Srs@Srs, L Ling/DOE/Srs@Srs
cc:
Subject: Comments on High-Level Waste Tank Closure DOE EIS 0303D

----- Forwarded by Drew Grainger/DOE/Srs on 01/24/01 09:51 AM -----

NEPA

01/24/01 09:43 AM

To: Drew Grainger/DOE/Srs
cc:
Subject: Comments on High-Level Waste Tank Closure DOE EIS 0303D

cc:Mail Forwarding Information
--------------- cc:Mail Forwarded ---------------
From: Cliff Blackman <cliff_blackman@mail.dnr.state.ga.us> AT SRS
Date: 01/22/2001 10:48 AM
To: nepa@mailhub.srs.gov AT SRS
Cc: Jim Hardeman <Jim_Hardeman@mail.dnr.state.ga.us> AT SRS
Subject: Comments on High-Level Waste Tank Closure DOE EIS 0303D

______________________________ Forward Header ______________________________
Subject: Comments on High-Level Waste Tank Closure DOE EIS 0303D
Author: Cliff Blackman <cliff_blackman@mail.dnr.state.ga.us> at SRS
Date: 1/22/01 10:48 AM

Please accept the attached comments and questions regarding the Draft EIS 0303D ... High-Level Waste Tank Closure. The main concern that I have is that the residual source term appears to be significantly underestimated. This may result in future doses that will be at least 2 orders of magnitude higher than presented in the EIS. L-14-1

The impact of such an underestimate will likely carry over from ground water to the Savannah River, as well. In such a case, drinking water and fish consumption from the Savannah River could be significantly impacted for thousands of years. Georgia and South Carolina cannot afford to ignore such potential impacts. Therefore, additional review is highly recommended prior to finalizing your EIS and closure methodology. L-14-2

It is recognized that the proposed grout-fill option probably represents the most cost-effective and safe method for closure of the tanks, at this time. If lower residual source terms cannot be guaranteed, however, additional barriers may be needed. L-14-3

Thank you for the opportunity to review this document.

Cliff Blackman,
Georgia Department of Natural Resources
404/894-2418 or 404/362-2675

Comments on DOE/EIS-0303D Draft Regarding High-Level Waste Tank Closure

1/22/2001

From: Cliff Blackman, Georgia Department of Natural Resources, Environmental Radiation Program
404/894-2418 or 404/362-2675 (Fax 404/894-3828) ... e-mail Cliff.Blackman@oip.gatech.edu

Residual Source-Term Concerns and Potential Consequences:

The long-term dose model appears to be based on an unrealistically low residual source term, as presented in Table C.3.1-1. Thus, the long-term dose estimates presented in the EIS may be at least two orders of magnitude too low. This source term, which was used in modeling the long-term consequences, represents only a fraction of the DOE figure-of-merit, achievable goal (1 – 2 % residual) spelled out in DOE/EIS-0303D (p 2-3). The residual term listed in Table C.3.1-1 is equivalent to 0.04% of the Sr-90 tank inventory, 0.2% of the Tc-99, 0.01% of the Cs-137, and 0.1% of the Pu-238 tank inventory, as derived from Table 3.3 of DOE/EIS-0082, WSRC-RP-92-250 (p 3-13), WSRC-RP-92-984 (p 3-23), and WSRC-RP-92-879-Rev 1 (p 3-19). In addition, source terms were not provided for several other significant, long-lived radionuclides that were reported to be in the waste tanks, including Pu-240, Am-241, and Cm-244. L-14-4

The use of the low EIS source term appears to be dependent on the use of oxalic acid for final wash and rinse. It should be noted that, based on the Bradley and Hill (1977) study of chemical dissolution of high level waste tank sludge, the highest dissolution achieved was 70% with well-mixed sludge. Assuming that this represents the best-case recovery, then the residual in Tank 16, after oxalic acid wash, may be higher than reported in Table 2-1. Since 6.0E+04 Ci was reportedly removed at this stage, a 70% recovery would suggest that as much as 2.6E+04 Ci or 0.9% of the initial 2.82E+06 Ci bulk in the tank may remain. This represents a much higher residual percentage than Table C.3.1-1, consistent with the DOE figure of merit (1-2 % residual). Therefore, lower residual fractions should not be assumed, unless adequate in-situ (in-tank) assays can demonstrate otherwise. L-14-5

Even if a lower residual can be demonstrated, oxalic acid is currently not approved without further criticality studies. Therefore, it's use should not be considered in the current EIS, especially since a criticality accident scenario was not included in the Accident Analysis (Appendix B) portion of the EIS. If later studies approve it's use, then an amended EIS can be generated, assuming that the interior of the tank is still accessible. The current EIS indicates that DOE considers bulk removal with spray washing (98% to 99% curie removal) as the limit of what is economically and technically practicable (P 2-3). Based on this statement and on Tank 16 experience, a 2 % residual should, therefore, be assumed. Using a 2% residual, the EIS residual inventory should be amended as follows: L-14-6

Radionuclide	EIS Source Term (Ci)	Proposed Amended Source Term (Ci)	Basis
Tc-99	4.9E+01	4.0E+02	DOE/EIS-0082 Table 3-3
Sr-90 (F+H)	1.6E+05	8.4E+06	WSRC-RP-92-984 p 3-23
Cs-137 (F+H)	9.9E+03	3.9E+06	WSRC-RP-92-250 p 3-13
Pu-238 (H)	1.7E+03	3.2E+04	WSRC-RP-92-879-Rev 1 Table 3-7
Pu-239 (F+H)	1.5E+02	4.4E+02	WSRC-RP-92-879-Rev 1 Table 3-7
Pu-240	Not Listed	2.2E+02	WSRC-RP-92-879-Rev 1 Table 3-7
Pu-241	Not Listed	1.7E+04	WSRC-RP-92-879-Rev 1 Table 3-7
Am-241	Not Listed	2.2E+03	WSRC-RP-92-879-Rev 1 Table 3-7 ... estimated in-growth from Pu-241, prior to 20-year decay
Cm-244	Not Listed	1.2E+03	DOE/EIS-0082 Table 3-3
Other Nuclides	---	No Change	

1

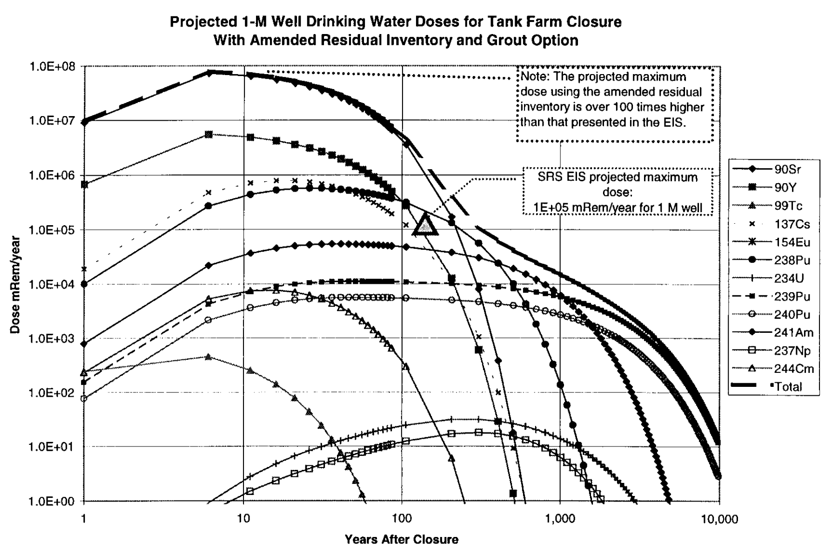
Comments on DOE/EIS-0303D Draft Regarding High-Level Waste Tank Closure ... cont.

1/22/2001

From: Cliff Blackman, Georgia Department of Natural Resources, Environmental Radiation Program
404/894-2418 or 404/362-2675 (Fax 404/894-3828) ... e-mail Cliff.Blackman@oip.gatech.edu

Of course, the Cs-137 residual inventory cannot be very well defined, at this stage, since the in-tank precipitate process has not worked. This leaves the fate of this material and residual inventory in question, at this time. A supplemental EIS for this process is currently under review, accordingly (p 1-14, 1-15 of DOE/EIS-0303D). It would appear that the lack of a good source term for Cs-137 could pose a significant problem, especially if high residuals (> 10%) are left. L-14-7

Using the above-proposed amended source term, the projected long-term doses and consequences should be re-evaluated. An initial dose projection using the D&D code (NRC) suggests that long-term dose may be underestimated by at least a factor of 100, as illustrated below for the 1-meter well scenario. Similar underestimates would apply for the 100-meter well, seepline, and surface water scenarios. If this is the case, then more thought should be given to improved closure options, and additional modeling would be in order. Of the options presented in the EIS, the tank closure with grout option still appears to be the most effective choice. Unless the residual can be improved, however, additional costs may be justified, in order to mitigate future consequences to groundwater and the Savannah River. L-14-8



2

Response to comment L-14-1: See response to L-14-4.

Response to comment L-14-2: See response to L-14-8.

Response to comment L-14-3: See response to L-14-8.

Response to comment L-14-4: DOE believes that the assumed source term values are appropriate for use in this EIS. As discussed in the response to comment L-2-8, Appendix C has been revised to present Table C.3.1-2, which lists the assumed volume of residual waste remaining in each closed HLW tank if the tanks are cleaned. Table C.3.1-1 has been revised to present the average concentration for each listed radionuclide (curies/gallon). These assumed volume estimates are based on previous experience with closure of Tanks 17 and 20 and on judgments of the effectiveness of the waste removal method. For example, in Tanks 17 and 20, the depth of the solids was estimated at various points in the tank by comparing the sludge level to objects of known height. These volume estimates (which typically are 100 or 1,000 gallons of sludge remaining in the closed tank) are not derived from applying the "figure-of-merit" referred to in the comment.

The characteristics of this residual sludge were based on knowledge of the processes that generated the waste. It was assumed that the residuals left behind after waste removal would have approximately the same composition as the sludge currently in the tanks. Before each tank is closed, the residual in that tank will be estimated and modeled to ensure that the closure is within requirements. In Tanks 17 and 20, the two tanks that were closed, this was done by separately estimating the volume and composition of the waste, and then combining these two pieces of information to develop tank inventories of each species of interest. A similar procedure will be followed in the future for residual waste in each tank.

Response to comment L-14-5: While it is true that oxalic acid cannot completely dissolve sludge, dissolving the sludge is not required to remove it. The hydraulic slurry techniques used to remove wastes from SRS waste tanks were designed to slurry and hydraulically convey solids out of the tank. The residuals remaining at the end of waste removal would be either (1) large, fast-settling particles that were not pumped out of the tank or (2) particles in difficult-to-reach locations where the liquid velocity was too low to suspend them. Oxalic acid loosens the particles and causes them to crumble, so that the larger particles can be removed, and particles can be dislodged from most difficult-to-reach locations. Admittedly, experience with oxalic acid cleaning is limited to one tank at SRS, Tank 16. See response to comment L-14-4 regarding DOE's assumed residual material volumes.

Response to comment L-14-6: See response to comment L-4-23.

Response to comment L-14-7: The residual material remaining in the closed HLW tanks would be composed of sludge. The quantity and characteristics of residual sludge depends on the completeness of bulk waste removal and cleaning, if necessary. It would be unaffected by decisions made regarding processing of the salt and supernate components of the waste.

Response to comment L-14-8: As discussed in the response to comment L-14-4, DOE believes that the assumed source term values are appropriate for use in this EIS. Therefore, additional long-term dose and consequence analysis is not necessary.

Drew Grainger

01/24/01 10:36 AM

To: John Knox/DOE/Srs@Srs, L Ling/DOE/Srs@Srs, George Hannah@Srs
cc:
Subject: DOE/EIS-0303D Tank Closure ... Additional Comments (Ga-DNR)

----- Forwarded by Drew Grainger/DOE/Srs on 01/24/01 10:37 AM -----

NEPA

01/24/01 10:13 AM

To: Drew Grainger/DOE/Srs
cc:
Subject: DOE/EIS-0303D Tank Closure ... Additional Comments (Ga-DNR)

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   cc:Mail Forwarding Information
--------------- cc:Mail Forwarded ---------------
From:       Cliff Blackman <cliff_blackman@mail.dnr.state.ga.us> AT SRS
Date:       01/24/2001 09:59 AM
To:         nepa@mailhub.srs.gov AT SRS
Cc:         Jim Hardeman <Jim_Hardeman@mail.dnr.state.ga.us> AT SRS
Subject:    DOE/EIS-0303D Tank Closure ... Additional Comments (Ga-DNR)
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Additional comments from GDNR I just received.

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______________________________ Forward Header __________________________________
Subject: DOE/EIS-0303D Tank Closure ... Additional Comments (Ga-DNR)
Author:  Cliff Blackman <cliff_blackman@mail.dnr.state.ga.us> at SRS
Date:    1/24/01 9:59 AM
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Please accept for review the additional EIS comments contained in the attachment. These comments relate to enhanced groundwater contaminant transport in the water table on the south side of the H-Area, and a possible relationship between a previously unknown fault (H-Fault) and highly permeable channels that reportedly transport a majority of this water to Four Mile Creek.

Thank you for the opportunity to review this EIS.

Cliff Blackman
Georgia Dept. of Natural Resources, Env. Radiation Program
cliff.blackman@oip.gatech.edu
404/894-2418 or -3776 (voice)
404/894-3828 (fax)

(See attached file: Tank_Rev2.doc)

- Tank_R~1.doc

Comments on DOE/EIS-0303D Draft Regarding High-Level Waste Tank Closure

1/24/2001 … Additional Comments

From: Cliff Blackman, Georgia Department of Natural Resources, Environmental Radiation Program
404/894-2418 or 404/362-2675 (Fax 404/894-3828) … e-mail Cliff.Blackman@oip.gatech.edu

H-Area (H-Fault and Channels) Hydro-Geologic Concerns:

Section 3.1.3 (Seismicity) and Figure 3.1.1 (map of seismic fault lines) of EIS-0303D indicate the presence of a previously unknown fault (H-Fault … for lack of another name) that passes through the southeastern corner of H-Area (Wike et al. 1996, WSRC-TR-96-0279 Rev. 1, p4-14). Previous hydro-geological studies of Sr-90 transport (Carlton et al., WSRC-RP-92-984) in this same area of SRS (Four-Mile Creek side of the water table divide) report that "much of the groundwater flow in this area of the plant appears to occur in narrow, high permeability channels in the sediments." It was suggested that the majority of the flow of underground contaminants entering the water table in this portion of H-Area follow these channels to outcrop into Four-Mile Creek. A similar study of Cs-137 transport (Carlton et al., WSRC-RP-92-250, p4-11) suggests "facilitated transport is taking place in this locality." L-15-1

The overlapping presence of H-Fault and the narrow, highly permeable channels are likely inter-connected, and thus provide a mechanism to facilitate future movement of contaminants from H-Area Tanks to Four-Mile Creek. Since several H-Area tanks (including 9 through 12) are reported to be in the water table (p.1-7 of EIS-0303D), contaminants from these tanks are likely to move rapidly through these channels to Four Mile Creek, once the bottom of these tanks corrode. This is likely to occur within 100 years, in which case the Sr-90 could pose a significant problem for consumption of surface water and fish from Four-Mile Creek and from the Savannah River. Current problems with Sr-90 in Four-Mile Creek would be insignificant compared to what could reach this creek in the future. Given the enhanced transport mechanism identified, provisions need to be made to insure that Sr-90 does not reach the water table in this area, at least until after 200 years. Possible facilitated transport of longer-lived contaminants (Pu-238, Pu-239, Am-241, etc.) in this area should also be reviewed in the MEPAS model presented in the EIS. L-15-2

Response to comment L-15-1: The offsets and displacements of the "H-Fault" are at a far greater depth than the solution channels around the seepage basins that can produce "facilitated transport."

Response to comment L-15-2: The channels causing "facilitated transport" occur in the vicinity of the F and H Area seepage basins, where very acidic water released into the sediments dissolved some of the soil constituents. Such dissolution channels do not occur in the area around the F- and H-Area Tank Farms. Transport from the tank farm areas would be through intact sediments for the greatest part of the flow paths.

United States Department of the Interior

OFFICE OF THE SECRETARY
OFFICE OF ENVIRONMENTAL POLICY AND COMPLIANCE
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

January 11, 2001

Rec.
JAN 16 2001

ER-00/840

Andrew R. Grainger, NEPA Coordinator
U.S. Department of Energy, Savannah River Operations Office
Building 742A, Room 183
Aiken, South Carolina 29802

ATTN: Tank Closure EIS

Dear Mr. Grainger:

The Department of the Interior has reviewed the draft Environmental Impact Statement for the High Level Waste Tank Closure at the Savannah River Site, Aiken, SC as requested. We have no comments to offer at this time. L-16-1

Thank you for the opportunity to review and comment on this draft EIS.

Sincerely,

James H. Lee

James H. Lee
Regional Environmental Officer

Response to comment L-16-1: Comment noted.

01/16/01 TUE 14:54 FAX 727 570 5517 PROTECTED SPECIES SER 001

Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

RECEIVED
NOV 29 2000

November 16, 2000

Dear Stakeholder

Enclosed for your review and comment is the U.S. Department of Energy's (DOE) *Savannah River Site High-Level Waste Tank Closure Draft Environmental Impact Statement* (EIS) (DOE/EIS-0303). DOE prepared this Draft EIS in accordance with the National Environmental Policy Act (NEPA) of 1969 and its implementing regulations.

This EIS evaluates three alternatives regarding closure of the high-level waste (HLW) tanks at the Savannah River Site (SRS). The three alternatives are: Clean and Stabilize the Tanks, Clean and Remove the Tanks, and No Action. Under the Clean and Stabilize the Tanks alternative, DOE is considering three options for tank stabilization: fill with grout (preferred alternative), fill with sand, and fill with saltstone.

DOE proposes to close the HLW tanks at SRS in accordance with applicable laws and regulations, DOE Orders and the *Industrial Wastewater Closure Plan for F- and H-Area High-Level Waste Tank Systems* (approved by the South Carolina Department of Health and Environmental Control), which specifies the management of residuals as waste incidental to reprocessing. The proposed action would begin after bulk waste removal has been completed.

Under the Clean and Stabilize Tanks or the Clean and Remove Tanks alternatives, DOE would close 49 HLW tanks and associated waste handling equipment, including evaporators, pumps, diversion boxes, and transfer lines. The Draft EIS assesses impacts primarily in the areas of water resources, air resources, public and worker health, waste management, socioeconomic impacts, and cumulative impacts.

The public comment period on this EIS extends through January 23, 2001. The Department will hold two public meeting—each with two sessions—to discuss the Draft EIS and receive comments. The meetings will be held in North Augusta and Columbia, South Carolina, in early January 2001. Dates and locations will be announced in the Federal Register and local media at least 15 days before the meetings.

In addition, comments may be submitted by mail to Andrew R. Grainger, NEPA Compliance Officer, Savannah River Site, Building 742-A, Room 185, Aiken, South Carolina 29802; electronically to nepa@srs.gov; or by calling 1-800-881-7292 and leaving a message.

TC/4/000/0428

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL	# of pages ►
To Grainger	From Hawk
Dept./Agency	Phone # 727 570-5312
Fax #	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

In preparing the Final EIS, DOE will consider all comments transmitted or postmarked by January 23, 2001. Comments submitted after this date will be considered to the extent practicable. DOE expects to issue the Final EIS in early 2001 and to issue a Record of Decision on SRS tank closure no sooner than 30 days after the Final EIS is issued. Thank you for your interest in the Department's activities.

Sincerely,

Andrew Grainger
NEPA Compliance Officer

Enclosure:
Savannah River Site High-Level Waste Tank Closure Draft Environmental Impact Statement

THE PROPOSED ACTION IS NOT LIKELY TO ADVERSELY AFFECT LISTED ENDANGERED OR THREATENED SPECIES OR DESIGNATED CRITICAL HABITAT PROTECTED BY THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED.

SECTION 7 COORDINATOR
NATIONAL MARINE FISHERIES SERVICE
SOUTHEAST REGIONAL OFFICE
ST. PETERSBURG, FLORIDA
DATE: Dec 22, 2000

L-17-1

Response to comment L-17-1: Comment noted.

Dec 14 00 08:06a EH-421 202 586-7031 p.2

STATE OF SOUTH CAROLINA

State Budget and Control Board

OFFICE OF STATE BUDGET

1122 LADY STREET, 12TH FLOOR
COLUMBIA, SOUTH CAROLINA 29201
(803) 734-2280

LES BOLES
DIRECTOR

ACKNOWLEDGEMENT

November 30, 2000

Ms. Carol M. Borgstrom
Director
Office of NEPA Policy & Compliance
1000 Independence Avenue, S.W.
Washington, DC 20585

Project Name: High - Level Waste Tank Closure Draft Environmental Impact Statement Savannah River Operations office Aiken, SC DOE/EIS-0303D

State Application Identifier:EIS-001115-012
Suspense Date: 1/13/2001

Dear Ms. Borgstrom:

Receipt of the above referenced project is acknowledged. The Grant Services Unit, Office of State Budget, has initiated an intergovernmental review of this project. You will be notified of the results of this review by the suspense date indicated above. South Carolina state agencies are reminded that if additional budget authorization is needed for this project, three copies of the completed GCR-1 form and two copies of the project proposal must be submitted to this office. This action should be initiated immediately, if required. Please include the State Application Identifier in any correspondence with our office regarding this project. If you have any questions please contact me at 734-0485. L-18-1

Sincerely,

Angela F. Stoner
Fiscal Manager, Grant Services

DEC 1 2 2000
EH-42

Fax (803) 734-0645

Response to comment L-18-1: Comment noted.

D.3 Public Meeting Comments and DOE Responses

The public meetings consisted of brief presentations by DOE on the Draft EIS, followed by a question and answer and comment period. Court reporters documented comments and statements made during these public meeting sessions. In the sessions, eight individuals had questions, provided comments, or made public statements.

In this section, each public speaker's statement is placed in context and paraphrased because some statements are dependent on previous statements and interspersed with other discussion. The transcripts from the meetings can be reviewed at the DOE Public Reading Rooms: DOE Freedom of Information Reading Room, Forrestal Building, Room 1E-190, 1000 Independence Avenue, S.W., Washington, D.C., 20585, Phone: 202-586-6020 and DOE Public Document Room, University of South Carolina, Aiken Campus, University Library, 2nd Floor, 171 University Parkway, Aiken, SC 29801, Phone: 803-648-6815.

Paraphrased comments from the meetings and DOE's responses are as follows:

M-01: The commenter asked if the EIS evaluated the potential re-use of the Tank Farm area as a brownfield site, which might be available for other future uses.

<u>Response</u>: As noted in the *Savannah River Site Future Use Plan*, DOE plans to continue active institutional control over the land around the F and H Areas (i.e., between Upper Three Runs and Fourmile Branch) as long as necessary to protect the public and the environment. Future industrial uses of this area would not be precluded as a result of tank closure actions, but DOE does not expect to consider nonindustrial uses. [The EIS does evaluate the potential long-term impacts of other future uses of the tank farm areas, by calculating radiation doses to persons obtaining drinking water from wells located 1 meter and 100 meters downgradient from the tank farm boundaries.]

M-02: The commenter asked if there were there any disposal ramifications connected with oxalic acid. The commenter further asked if there was a product other than oxalic acid that could be used to remove the residual material in the tanks.

<u>Response</u>: Extensive use of oxalic acid cleaning may result in conditions that, if not addressed by checks within the Defense Waste Processing Facility (DWPF) feed preparation process, could allow carryover of sodium oxalate to the vitrification process. The presence of oxalates in the waste feed to DWPF that would result from oxalic acid cleaning would adversely affect the quality of the HLW glass produced at DWPF. To prevent that from occurring, special batches of the salt treatment process would be scheduled, in which the sodium oxalate concentrations would be controlled to not exceed their solubility limit in the low-radioactivity fraction.

Section 2.1 of the EIS cites an earlier DOE study that led to the selection of oxalic acid as the preferred chemical cleaning agent. The study examined cleaning agents that would not aggressively attack carbon steel and were compatible with HLW processes. The studies included tests with waste simulants and also tests with actual Tank 16 sludge. The agents tested were disodium salt EDTA, glycolic acid, formic acid, sulfamic acid, citric acid, dilute sulfuric acid, alkaline permanganate, and oxalic acid. None of these agents completely dissolved the sludge, but oxalic acid was shown to dissolve about 70 percent of the sludge in a well-mixed sample at 25º C, which was the highest of any of the cleaning agents tested.

M-03: The commenter asked if the Clean and Remove Tanks Alternative would result in making the Tank Farm area more favorable for potential future uses.

<u>Response</u>: Under the Clean and Remove Tanks Alternative, the tanks would be cleaned to the extent of allowing the steel tank components to be cut up, removed, and transported to SRS radioactive waste disposal facilities. DOE would then backfill the excavations left after tank removal. As noted in the response to

comment M-01, future industrial uses of this area would not be precluded as a result of tank closure actions, but DOE does not expect to consider non-industrial uses. [As discussed in Section S.8.2, the Clean and Remove Tanks Alternative would have somewhat less impact on future land use because the tank systems would be removed.]

M-04: The commenter asked if the long-term impact analysis was based on standard EPA drinking water assumptions (i.e., two liters per day). Also, for the 1-meter and 100-meter wells, do the impacts assume a direct use of groundwater?

Response: The long-term impact analysis assumed a water ingestion rate of two liters per day. The impacts presented in the EIS for the 1-meter and 100-meter wells were based on direct consumption of the groundwater from hypothetical wells at these locations. Other assumptions are described in Appendix C.

M-05: The commenter asked where does Fourmile Branch eventually flow to.

Response: The water in Fourmile Branch flows directly to the Savannah River.

M-06: The commenter asked, for the Clean and Remove Tanks Alternative, if the removed tank components would be disposed in the SRS E-Area vaults.

Response: The removed tank components would be transported to SRS radioactive waste disposal facilities (assumed to be the E-Area Vaults) for disposal.

M-07: The commenter asked if the stabilizing material (i.e., grout, sand, or saltstone) would also be emplaced in the tank annulus.

Response: For those tank types that have annuli, in addition to cleaning the tanks, DOE would also clean and backfill the annulus with a stabilizing material (uncontaminated grout in the Fill with Saltstone Option). [Section 2.1.1. has been revised to clarify this point.]

M-08: The commenter asked if, after tank closure has been completed, the Tank Farm area would be considered a brownfield site that is available for other uses, or would it be left in an unusable state. The commenter further asked what DOE envisions the area will look like when tank closure activities have been completed (i.e., would the area be flat, would it be covered with a clay cap, would it be asphalted).

Response: As noted in the *Savannah River Site Future Use Plan*, land around the F and H Areas (i.e., between Upper Three Runs and Fourmile Branch) as long as necessary to protect the public and the environment. Future industrial uses of this area would not be precluded as a result of tank closure actions. [The EIS does evaluate the potential long-term impacts of other future uses of the tank farm areas, by calculating radiation doses to persons obtaining drinking water from wells located 1-meter and 100-meters downgradient from the tank farm boundary]. The area may be capped or an in situ groundwater treatment system may be installed. The necessity for a low-permeability cap, such as a clay cap, over a tank group to reduce rainwater infiltration would be established in accordance with the environmental restoration program described in the Federal Facility Agreement. The cap construction would ensure that rain falling on the area drains away from the closed tank(s) and surrounding soil. A soil cover could be placed over the cap and seeded to prevent erosion.

M-09: The commenter asked what is the regulatory scheme once a tank has been closed. The commenter asked if it would be regulated as a low-level waste under South Carolina law. The commenter further asked what implications the regulatory scheme would have on the proposed administrative control over the Tank Farm area. Does the EIS assume that the federal government maintains administrative control over the site for the entire 10,000-year period of analysis?

Response: The residual material would be managed as low-level waste consistent with the requirements of DOE Order 435.1, "Radioactive

Waste Management." As noted in the *Savannah River Site Future Use Plan*, the land around the F and H Areas (i.e., between Upper Three Runs and Fourmile Branch) will be considered in the industrial use category. Consequently, DOE plans to continue active institutional control for those areas as long as necessary to protect the public and the environment. [The future land use of the tank farm area would not be affected by regulations governing the tank closure program or by the choice of a tank closure alternative. In addition, over the 10,000-year period of analysis in the EIS, DOE does not envision relinquishing control of this area. However, DOE recognizes that there is uncertainty in projecting future land use and effectiveness of institutional controls considered in this EIS. For purposes of analysis, DOE assumes direct physical control in the General Separations Area only for the next 100 years.]

M-10: The commenter asked if, for all of the tanks, DOE's preference is to leave them in the ground and fill them with grout.

<u>Response</u>: DOE's preferred alternative is the Fill with Grout Option under the Stabilize Tanks Alternative. Before each individual tank is closed, DOE will prepare a tank-specific closure module for that tank.

M-11: The commenter asked what DOE would do if, in the course of performing waste removal on the single-shell tanks, a leakage of waste is found that has moved beneath the tank. The commenter expressed the desire that DOE then consider removal of that tank.

<u>Response</u>: If, during the closure process, DOE were to discover a leaking tank, DOE would identify the location of the leak and take immediate action to stop the leak (e.g., remove the waste to below the level of the leak). DOE would then re-evaluate the closure plans for that tank. Depending on the ability of cleaning to meet the performance requirements for a given tank, the decision maker may elect to remove a tank if it is not possible to meet the performance requirements by another method. Only one tank (Tank 16) has leaked waste to the environment. In Tank 16, the waste overflowed the annulus pan (secondary containment) and a few tens of gallons of waste migrated into the surrounding soil, presumably through a construction joint in the concrete encasement. Waste removal from the Tank 16 primary vessel was completed in 1980.

M-12: The commenter stated that, over a period of time, these tanks rust away anyway. The commenter noted that, if these tanks were to rust away, this would get rid of them.

<u>Response</u>: The situation described by the commenter is equivalent to the No Action Alternative evaluated in the EIS. In the assessment of that alternative, DOE assumes that, at some point in the future, the tank top, grout, and basemat would fail, with a corresponding increase in their respective hydraulic conductivities. The long-term impacts of No Action are reviewed in the EIS. In accordance with the Federal Facility Agreement, DOE intends to remove the tanks from service as their missions are completed. For 24 tanks that do not meet the EPA's secondary containment standards, DOE is obligated to remove the tanks from service by 2022.

M-13: The commenter asked if a Record of Decision were to be issued that says that DOE will stabilize the tanks with grout, is there then nothing that would preclude, on a case-by-case basis, removing a given tank.

<u>Response</u>: In the Draft EIS, DOE examined the impacts of both tank removal and grouting in-place. Depending on the ability of cleaning to meet the performance requirements for a given tank, the decision maker may elect to remove a tank if it is not possible to meet the performance requirements by another method. This EIS captures the environmental and health and safety impacts of both options.

M-14: The commenter asked why the long-term dose at the 1-meter well for H Area is substantially higher than for F Area.

<u>Response</u>: In the H-Area Tank Farm north of the groundwater divide, most of the calculated radiation dose at the 1-meter well is attributable

to Tanks 9 through 12. Those four tanks are submerged in the water table aquifer; thus, the transport of contaminants is driven by horizontal infiltration of groundwater rather than vertical infiltration of rainwater, causing the rapid transport of contaminants (i.e., before they can decay) to nearby locations such as the 1-meter well.

M-15: The commenter noted that, for the Fill with Saltstone Option, the EIS presents a radiation dose value of 1,800 person-rem. The commenter asked what time period that exposure represented (i.e., is it over 10,000 years or one lifetime). The commenter further asked about the radiation dose to the downstream consumers of water from the Savannah River.

Response: The short-term impacts were evaluated over a 30-year time frame. The value cited by the commenter represents the collective radiation dose to the workers doing the tank closure activity (i.e., over that period of time that it takes to close all 49 tanks). The downstream drinking water numbers for people consuming Savannah River water over the long term are also presented in the EIS (Table 4.2.5-3).

M-16: The commenter stated that there are many sources other than the Tank Farms in the General Separations Area that could impact the same groundwater and surface water. These include the canyons, the old radioactive waste burial ground, and the Mixed Waste Management Facility. The commenter asked if these sources are all covered under the same 4 millirem/year performance objective.

Response: In the HLW tank closure process, DOE considers all other non-tank sources within the Groundwater Transport Segment (GTS) applicable to the Tank Farm tanks. The combined impacts of all sources in the GTS must be below the performance objective. [Section 5.7 of the EIS discusses the long-term impacts of non-tank sources.]

M-17: The commenter asked if there was a schedule for the Final EIS. The commenter asked if this Final EIS schedule would impact the schedule for closure of Tank 19.

Response: DOE intends to issue a Final EIS in October 2001 and a ROD by November 2001. This will not impact the Tank 19 closure schedule, which is required by the Federal Facility Agreement to be closed by Fiscal Year 2003. [This schedule was DOE's stated intention as of January 2001.]

M-18: The commenter asked for further description of saltstone. The commenter further asked if SRS has previously produced or disposed of any saltstone.

Response: Saltstone is a low-activity waste that is produced at SRS. It is an evaporated low-radioactivity waste, which is mixed with cement, slag, and fly ash to produce a grout. The grout, which contains large concentrations of nitrates, is then poured into concrete vaults. In this EIS, this material is being considered as a potential tank stabilization material. The SRS Saltstone Manufacturing and Disposal Facility began operations in 1990 and operated until 1998 (when it was shut down for lack of feed material). During this period, saltstone was emplaced into two saltstone disposal vaults. The current plan is for this facility to resume operations in 2002.

M-19: The commenter expressed a concern regarding the potential impacts that new SRS missions might have on the amount of HLW generated and stored in the Tank Farms. The commenter was concerned about how this additional waste could affect the HLW tank closure process. The commenter also asked about what tank closure activities have occurred since 1996.

Response: The HLW program utilizes a "High-Level Waste System Plan" to help plan and manage the operation of the Tank Farms, DWPF, and associated systems. This plan is updated annually and whenever there are major perturbations to the system. Included in this plan are the known influents to the HLW system. Potential impacts from new missions will be included in this planning document. This EIS considers alternatives for closure of empty HLW tanks; therefore, impacts of new HLW generation are not within the scope of this document. [Section 4.1.10.1 of this EIS does consider the potential impacts of tank closure alternatives on HLW volumes.]

The process of preparing to close tanks began in 1995. DOE prepared the *Industrial Wastewater Closure Plan for F- and H-Area High-Level Waste Tank Systems* that describes the general protocol for closing the tanks. This document (referred to as the General Closure Plan) was developed with extensive interaction with the State of South Carolina and EPA. Concurrent with the General Closure Plan, DOE prepared the *Environmental Assessment for the Closure of the High* Level *Waste Tanks in F- and H-Areas at the Savannah River Site*. In a Finding of No Significant Impact published on July 31, 1996, DOE concluded that closure of the HLW tanks in accordance with the General Closure Plan would not result in significant environmental impacts.

Accordingly, DOE began to close Tank 20, from which the bulk waste had already been removed. In accordance with the General Closure Plan, DOE prepared a tank-specific closure plan that outlined the specific steps for Tank 20 closure and presented the long-term environmental impacts of the closure. The State of South Carolina approved the Closure Module, and Tank 20 closure was completed on July 31, 1997. Later in 1997, following preparation and approval of a tank-specific Closure Module, Tank 17 was closed.

DOE decided to prepare this EIS before any additional HLW tanks are closed at SRS. This decision is based on several factors, including the desire to further explore the environmental impacts from closure and to open a new round of information sharing and dialogue with stakeholders. SRS is committed in the Federal Facility Agreement to close another HLW tank by Fiscal Year 2003.

The National Research Council released a study (National Research Council 1999) examining the technical options for HLW treatment and tank closure at the Idaho National Engineering and Environmental Laboratory (INEEL). The Council concluded that clean closure is impractical; some residual radioactivity will remain but, with rational judgement and prudent management, it is reasonable to expect all options will result in very low risks. Recommendations made by the Council included: 1- establish closure criteria, 2-develop an innovative sampling plan based on risks, and 3- conduct testing to anticipate possible process failure. The SRS General Closure Plan had anticipated and includes points similar to those raised by the Council.

M-20: The commenter made a statement that it is important to close the HLW tanks and the commenter is happy that DOE is making progress toward this goal.

<u>Response</u>: Comment noted.

M-21: The commenter stated that he recalled difficulty in removing waste from the tanks, particularly the saltcake material. The commenter inquired if the use of oxalic acid would be necessary to remove this material from the tanks.

<u>Response</u>: The salt portion of the waste is soluble and thus readily removed by water. The use of oxalic acid would only be required when removing insoluble materials (i.e., sludge) from the tanks. DOE anticipates that oxalic acid would be needed to clean tanks that contain the more radioactive first-cycle wastes (about three-fourths of the tanks).

M-22: The commenter stated that a factor affecting the tank closure process is operation of the DWPF. The commenter asked if DWPF was currently operating or if it was shut down.

<u>Response</u>: The DWPF is operating to process and vitrify the sludge component of the HLW. As of December 2000, DWPF had produced approximately 1,000 canisters of vitrified waste.

References

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National Research Council, 1999. *Alternative High-Level Waste Treatments at the Idaho National Engineering and Environmental Laboratory,* National Academy Press, Washington, D.C.